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# ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXX. No. 3350. FEBRUARY 6, 1942 6d. WEEKLY

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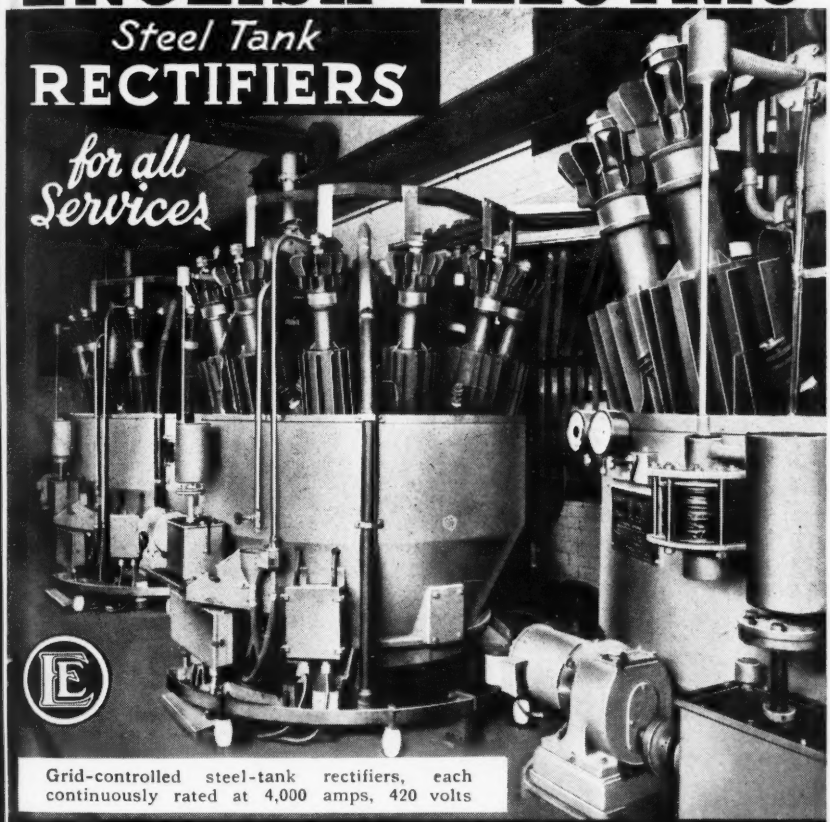

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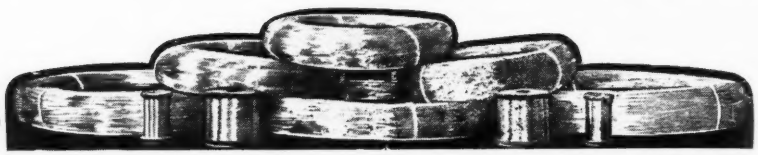

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# ELECTRICAL REVIEW

Volume CXXX No. 3350

Friday, February 6, 1942

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**EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1**

Telegraphic Address: "Ageekay, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (35 lines).
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.
Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign £1 14s. 8d. per annum.
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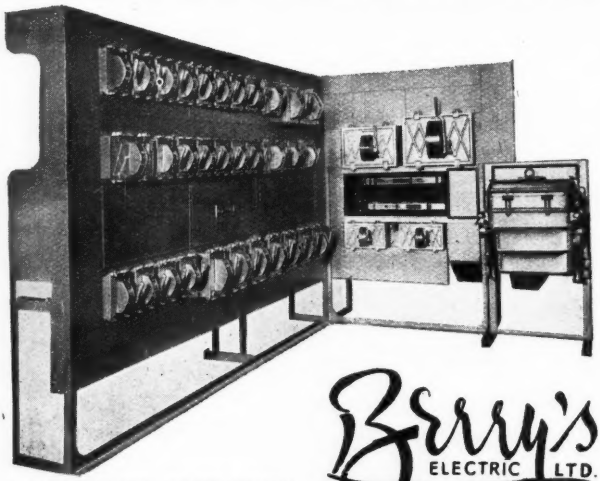

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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXX. No. 3350. FEBRUARY 6, 1942 6d. WEEKLY


# The Post-War Pattern

## *Electricity's Essential Role*

MUCH is being said and written on reconstruction after the war. New Jerusalems are envisaged by inveterate believers in the fundamental goodness of human nature, while at the other extreme is the belt-tightening school which foresees extreme poverty and a permanent reduction in our standard of life.

Our older readers (some of them still young) will recall the similar aspirations and gloomy prophecies expressed between 1914 and 1918 and while they will agree that things ought to be very different after the war, they may wonder whether they will be. We think that they can be sure of this, for the present war is much more of a world upheaval than the last—more a clash of ideas regarding the way in which world affairs should be managed.

### Probable Conditions

Many of the domestic problems will be similar to those which arose before: the demobilisation of large forces and the release of munition workers from the factories, accompanied by a swollen productive capacity in a market depressed by unemployment and continued heavy taxation. Exactly what conditions will be like is unforeseeable, so that the preparation of rigid reconstruction schemes is quite likely to be a waste of time.

All that can be done is to take account of certain inevitabilities, which may be eased or worsened by the circumstances of the time, and cultivate a state of mind among the leaders and the people which will enable them to meet the drastically-altered conditions philosophically and create in them the will to face the peace with the same determination as they are devoting to the winning of the war.

From 1919 onwards the electrical industry was fortunately placed. It had only just begun to establish itself and it had the world before it. As so many opportunities have been seized in the intervening period the scope is not now so tremendous, but nobody can say that the industry has reached its peak by any means.

### Arrears to Make Good

Industrial electrification has been speeded up but at the same time all non-militant activities have been retarded or suspended and for this reason there will be a great deal of arrears to be made good.

That should give us a start and while the work is being tackled we may hope for a resumption of development activity to bring about new applications and wide extensions of existing ones. We can see many directions in which electrification will become practically essential. To quote just two instances: the electric vehicle, so valuable at the moment as a non-consumer of petrol, must be developed to supplant much of the internal-combustion-engined transport; and the country's factories, offices, shops and homes will have to be lighted in a much better manner than is considered sufficient to-day. But there are other opportunities, not so free from challenge as these, to which attention

will have to be paid. Such concrete cases can be studied with profit in preparation for "the day" and consideration can be given to fitting them into the new scheme of things.

**E.P.E.A. and T.U.C.**

BY a substantial majority members of the Electrical Power Engineers' Association have decided in favour of affiliation to the Trade Union Congress. A total of 5,287 ballot papers were issued and 3,578 were returned. These showed that 2,374 members wished affiliation to proceed while 1,144 were against it; 60 papers were spoiled. The result was not unexpected, for a very strong case was put up in favour of linking-up with the T.U.C. Opponents were somewhat doubtful regarding the possible political significance of the move, but there seems to be agreement that on the "economic" side, at least, more can be accomplished by the Association in union with Congress than by itself.

**Accidents to Trainees**

GUIDANCE regarding the risks associated with their occupations should be given to new workers in industry as though they were "young persons." That is the recommendation made by the Chief Inspector of Factories, Col. A. W. Garrett, in "How Factory Accidents Happen" (Stationery Office, 6d. net), publication of which has now been resumed. Out of twenty-seven accidents selected, three were connected with electricity. One was caused by the fouling of a temporary overhead line by a crane during the construction of a new factory, the second was a sequel to defective black-out ventilation, and the third was a tank explosion due to ignition of petrol by a 12-V inspection lamp. All could have been avoided by adequate technical supervision.

**Minimum Charges**

ELECTRICITY Orders usually provide that consumers shall pay a minimum charge per quarter, based upon a certain number of kWh, to make it worth the undertaking's while to provide service. It has been held that such a charge is not conducive to the economy in consumption which is so necessary now and in several places it has been suspended. No doubt this has a certain value as a "gesture" but in fact there is little more in it. As a rule the minimum charge is based on a normal lighting consumption so that the employment of, say, an iron soon brings consumption up to the minimum. The question of the fixed charge of a two-part tariff is quite another matter; consumers may well ask why they should pay a higher overall charge per kWh as a penalty for economy. Recent price reductions have generally been applied only to secondary charges but undertakings might consider the possibility of lowering the fixed charge.

**Another Grid Anomaly**

ATTENTION is drawn in the January *Electrical Power Engineer* to what is considered a hardship to some power-station men brought about by connection of undertakings to the grid. With the latter acting as stand-by there is no need for an undertaking to install the extra plant which would otherwise be required, and consequently the station classification is lower, to the disadvantage of the members of the staff. The employers with the National Joint Board have admitted that this is anomalous and have agreed in some cases to a higher classification for the outside staffs, who are principally affected. It is considered that only an alteration of the salaries schedule can effect a remedy, but the time is not propitious; and until circumstances permit amendment, it is only possible to press for reclassification in obvious cases of injustice.

**Sabotage in South Africa**

CONFUSED and exaggerated reports of sabotage in South Africa appeared in the daily press last week. Some papers said that the principal power stations on the Rand had been blown up, whereas in actual fact the damage seems to have been confined to transmission lines which were quickly repaired. One report referred to an explosion at the Vereeniging power station "which gets its supply direct from the Victoria Falls, 600 miles to the north." The supply of what was not stated. There is, of course, only a small plant at the Falls and Vereeniging, a steam station, has nothing to do with it.

***Paper is valuable—save all you can***

# A Novel Conversion

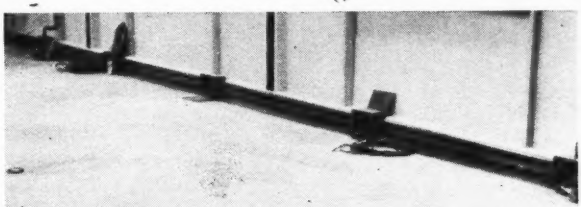
## *From Brewery to Film Apparatus Factory*

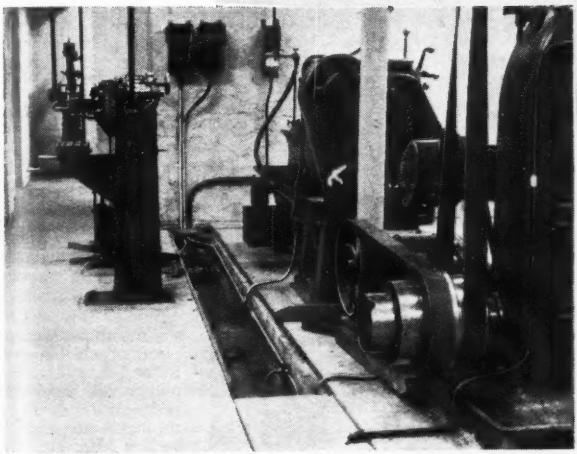
**In equipping the building for its new use many difficulties were encountered. How these were overcome and a flexible electrical installation provided is described in the accompanying article**

A FACTORY which British Acoustic Films, Ltd., has just established in the West of England to produce components for cinematograph sound film, amplifier, 16-mm. substandard sound projectors, and similar apparatus, is of interest electrically for two reasons, first the ingenuity shown in overcoming installation difficulties, and secondly the elaborate scheme of fluorescent lighting.

Until twelve months ago the building was a brewery, out of commission for the preceding ten years, but still fully equipped with all its plant. The dismantling and removal of this plant and the conversion of the various departments to their new uses presented the company with a pretty problem, necessitating in most cases the reconstruction of the whole of the concrete flooring. That it was possible to commence production after only three months, speaks well for the skill and diligence of the company's engineering department, which with its many years of experience in cinema installations undertook the work unaided.

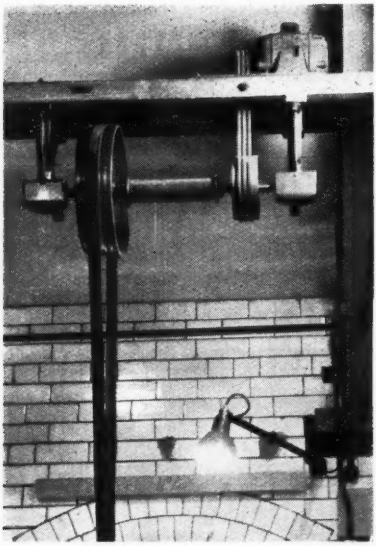
Recently we were shown over the factory by Mr. R.A. Tomes, the works manager, and Mr. A. H. Richardson, who was responsible for the electrical layout, and were able to appreciate some of the difficulties from the electrical point of view. The greatest of these was probably the difference in floor levels. In the capstan section of the machine shop, for instance, the headroom is almost unlimited and it has been necessary to mount the electric motors high up with long belt drives to the machines. At the other extreme, the main machine shop adjoining originally had only 8 ft. headroom, making it necessary to lower the floor a foot to provide the necessary clearance for the motors mounted above To be exact, the floor was dropped 18 in., and 6 in. of concrete was laid to give a rigid

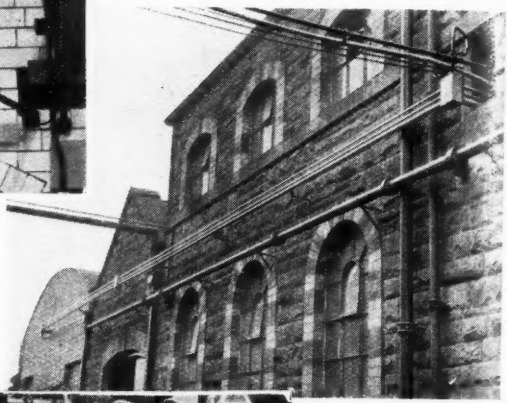




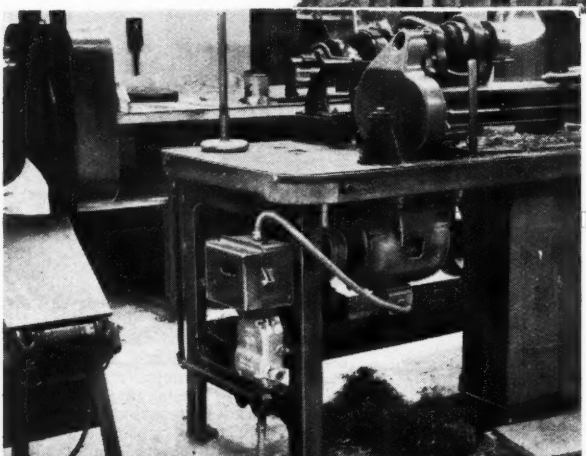
**The wiring arrangements in the new factory: note the connecting points in the floor.**

**Left: Ducts have been left in the floor of the machine shop to facilitate the installation or the rearrangement of plant**





**Above: Motors are generally mounted above the machines out of the way of the operators, extensive use being made of V-belt drive. Right: Conduit taken outside the building to overcome the difficulty of negotiating thick walls and hot-water pipes. Below: Underbench mounting of motor**



foundation for the mounting of the machinery.

In the re-laying of this floor provision was made for any possible arrangement or re-arrangement of the machines by leaving ducts with readily removable covers at intervals all across the shop. Similar foresight aiming at facilitating plant alterations is evident in a new single-storey building which has been erected close to the original works. Here, however, instead of covered ducts, metal conduits are set 6 ft. apart in the concrete floor to connect up with boxes mounted along the walls at skirting level. The wall connecting boxes themselves are fed by 1½-in. conduits mounted on the surface of the walls, which, being constructed of "Thermocoust" (2-in. boards of plaster and wood shavings cemented over each side and claimed to have the same insulating properties as 9 in. of brick) are unsuitable for recessing work. Access to standard circular conduit boxes in the floor is obtainable every 6 ft. through 2½-in. diameter holes.

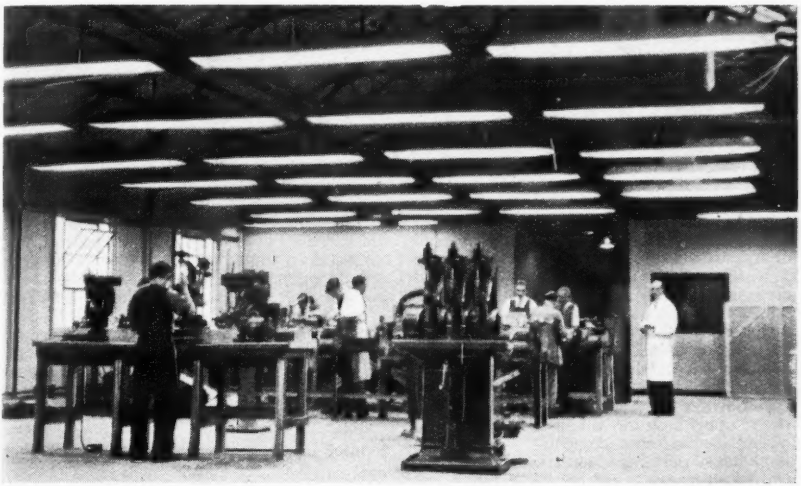
When it is decided where any particular piece of machinery is to go, it is a simple matter to draw the necessary wiring through the desired section of conduit and no matter where a machine is required there is thus a supply available within 3 ft. The conduit boxes in the floor are built up of

biscuit rings to just under floor level so that if they are not needed it is possible to fit a standard cover flush with the level of the concrete.

In the main building, the fact that the walls in some cases are 2 or 3 ft. thick and that there is a large number of hot-water pipes set in them at inconvenient places, has added another problem of wiring and in some cases the conduit is taken outside the building, and carried back through the walls at the required points. All the trunking and busbar chambers employed in the installation have been constructed by the company, and we were interested to see how the main and sub-switchboards housing G.E.C. and "Glasgow Rex" metal-clad switch-fuse gear were made up of its standard amplifier rack units. The main oil circuit-breaker is a 400-A, G.E.C. unit. A 6.6-kV supply is stepped down to the factory pressure of 400 V by means of a 400-kVA Bonar Long transformer, controlled on the high-voltage side by a triple-pole air-break switch supplied by Electric Transmission, Ltd., and on the low-voltage side by English Electric h.r.c. switchgear.

In the mounting of the motors, some of the difficulties of which we have already mentioned, positions have been carefully chosen out of the way of the operators, generally above the machines, but sometimes where more convenient, underneath. With very few exceptions, individual drive has been adopted everywhere and extensive use has been made of V-belt drive. The motors, each with their direct-on-line contactor starters, are all of B.T.H. construction.

Despite the unpromising nature of the building the lighting installation is one of the best we have ever seen. In all the most important situations "Osira" 5-ft., 80-W fluorescent tubes have been employed to give a high intensity and well diffused illumination of about 20 ft.-candles all over the working plane.



**A portion of the new section of the factory indicating the extensive use of fluorescent lighting**

Actually this source of illumination was almost the only one possible in the machine shop with its low ceiling and complete lack of daylight. Apart from the shallowness of the fittings housing the tubes, the heat generated by any other source of illumination giving an equal intensity of light would have made the atmosphere unbearable for the machine operators.

Especially striking is the use of this form of lighting in the new building where no fewer than eighty-seven tubes are utilised to illuminate a production area of approximately 6,000 sq. ft. The quality as well as the intensity of the light produced leaves little doubt of the future in store for this form of illumination.

For lighting other departments where the somewhat higher initial cost of the fluorescent tubes has not been considered justified a generous installation of Benjamin "Glasteel" pendants containing 200-W incandescent lamps has been provided, supplemented in the drawing office by Mek-Elek adjustable desk units. Whichever source of lighting is used it is, however, evident that the company has learnt to respect good illumination as a means of securing maximum output under the best possible conditions.

# Appliance Standardisation

## *Drawing Up Post-War Plans*

**By A. C. Hazel**

ONE of the matters which will have to be considered now in connection with the post-war development of our great industry is the question of the standardisation of appliances. It is appreciated that this is a subject to which much consideration has been given in the past, but it is contended that conditions after the war are going to be such that standardisation of appliances will be almost essential.

Post-war conditions will create an extraordinary demand for electrical appliances of all kinds, particularly electric cookers. It is quite evident that there will have to be rebuilding and rehousing schemes on a large scale and the public will expect to purchase the electrical appliances for their new homes at a reasonable price, and they will also expect them to last for a reasonable time. It is also obvious that the electricity supply industry will have to face considerable competition from the gas industry which will provide gas appliances at the lowest possible cost.

**Suggestions are made which will enable the electrical industry to meet future public demands and counter the strong gas competition which may be expected**

It is agreed that there is going to be a considerable demand for domestic appliances; the next step is to consider the advantages and disadvantages of standardisation. These are fairly obvious, and the advantages in addition to that of economy and ease of manufacture can be boiled down to—simplified maintenance with a consequent reduction in the number of spare parts, and the cost of repairs; and a reduction in the showroom space required and in the amount of staff training necessary, for otherwise men who have returned from the Forces will have to be specially trained to deal with the repair and sale of a large number of different sorts of appliances.

### Disadvantages Outweighed

The disadvantages are, mainly, the possibility that there will be a slowing-up of development because individual manufacturers will be discouraged from introducing improvements from time to time; and the public may complain about lack of choice. Generally speaking it must, however, be admitted that the arguments are in favour of standardised appliances.

But if standardised appliances are to be the rule after the war every effort must be made to ensure that they are the best the industry can design and produce. The electric cooker, for example, must incorporate all the advantages of the various cookers at present on the market and it should be better than the best gas cooker. Consideration might be given to the possibility of producing a cooker which would only have a short life as compared with a more lasting model with a view to producing new cookers regularly. With regard to the number of designs and sizes, there might be a range of three sizes with two designs—a standard type and a " de luxe " model.

Cookers should be so designed that the smallest number of spare parts would have to be carried by the supply undertaking; all connections should be concealed; oven grids should be made of rustless material of round section rod; and cookers should be easily cleaned inside as well as outside. There is considerable room for improvement in connection with door hinges and latches; well-fitting oven doors are essential for good cooking. In addition to standardising the actual cookers consideration will also have to be given to the advisibility of the cookers being hired or hire purchased. Generally the rates should be as low as possible.

To those who argue that standardised appliances are not practicable we would instance the " Electrolux " gas refrigerator which has been extremely successful in spite of our competition with a wide range of electric refrigerators. All electrical appliances might with advantage be standardised, even the fire which could be especially designed for particular purposes. We can foresee an electric fire designed for bedroom use as well as one for the kitchen. Of course each type would probably have to be produced in two finishes and two sizes.

One thing is quite obvious and that is that the design of electrical appliances will have to be improved during the war as there will be very little time in which to design new appliances afterwards when cookers and other domestic appliances will be required almost immediately.

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## Tasmanian Hydro-Electric Extensions

IT is reported that the Tasmanian Government proposes to spend over a million pounds on an extensive programme of public works, including £700,000 on hydro-electric extensions. Further development of the Upper Derwent and Great Lake schemes is to be undertaken, including extensions to Waddamana " B " power station by the installation of the third and fourth units and of the Tarraleah power station by the installation of the sixth unit.

# The Static Relay

## *Constant Standard of Performance*

By W. R. Thistlethwaite

AN interesting application of metallic rectifiers is to be found in the static relay, which in certain cases may be used to replace a relay of the polarised type. It has the advantage of having no moving parts and will therefore retain a constant standard of performance for an indefinite period.

Fig. 1 shows a circuit in which the relay is being used for the control of audio-frequency signalling currents. It consists of two networks A and B of copper-oxide rectifiers, used in conjunction with a transformer and a 4-$\mu$F condenser. It depends for its action upon the fact that the impedance of a copper oxide rectifier to a small alternating voltage may be controlled by the value and direction of a small *steady* voltage on which the alternating voltage is superimposed.

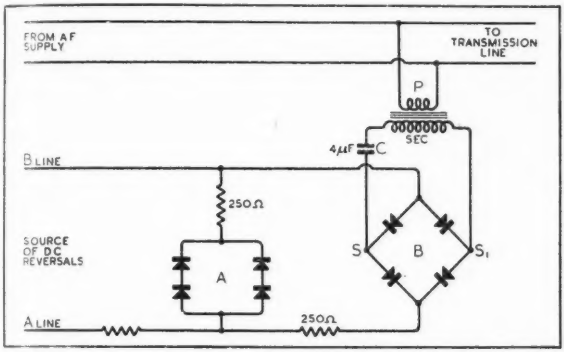



**Fig. 1.—Use of relay for controlling audio-frequency signalling currents**

The type of rectifier used has an average voltage-to-current curve as shown in fig. 2. Assuming a steady voltage is applied of such a value that the rectifier is operating at either point a or b on the curve, the rectifier then offers a high impedance to the small alternating voltage which may be impressed upon it. If, however, the steady voltage applied is in such a direction and of such a value that the rectifier conducts, and its point of operation is now moved to c, then its impedance to a small impressed alternating voltage will be very low. The rectifiers are therefore, variable impedances whose value, high or low, is controlled by the direction and value of an applied *direct* current.

The arrangement shown in fig. 1 could be used to key an audio-frequency carrier feeding a transmission line, from some source of direct-current reversals applied to the A and B lines. The signals are applied to the copper-oxide rectifier networks. Network A conducts when a positive current is applied to line A and network B when a positive current is applied to line B. The network B is in the form of a bridge, to the centre point of which S and S1 the secondary circuit of the transformer, is connected. The resistance of the group of rectifiers in each of the networks is approximately 250 ohms. This may be calculated from the relationship of current and voltage at the point c on the characteristic curve shown in fig. 2.

The potential difference developed across network A and its 250 ohms series resistance by the current when a positive battery is applied to the A line, functions as a negative voltage applied to the bridge B, and biases back the rectifiers of that bridge sufficiently to prevent alternating current (induced from the a.f. supply in the primary of the transformer) passing between S and S1. In this condition the secondary circuit of the transformer is virtually open circuited, and does not absorb power from the primary winding. The power level of the transmitted a.f. carrier therefore rises and attains a value approximating to that obtained with the

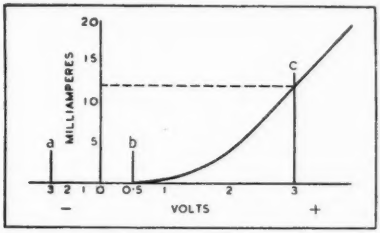



**Fig. 2.—Average voltage-to-current curve of rectifier. The resistance in the negative direction (1-10V) varies from 300,000 to 700,000 ohms with different rectifiers**

secondary on full open circuit, the losses in the primary winding due to magnetisation and eddy currents being small on account of the employment of a permalloy core in the transformer.

The 4-$\mu$F condenser, C, allows the passage of alternating currents through the secondary winding of the transformer, but prevents the passage of a direct current, since this would cause the core to become saturated.

When a positive battery is applied to line B, bridge B conducts, and the rectifiers of this bridge are biased to point c on the characteristic curve of fig. 2. They offer little impedance to the alternating potential set up by the carrier across the secondary circuit of the transformer, S and S1 being virtually short-circuited. The secondary circuit, being thus closed with a low impedance, absorbs power from the primary and attenuates the transmitted carrier to such a low level as to prevent the passage of the a.f. current to the transmission line. In effect the a.f. supply is short-circuited.

Apart from the advantage already mentioned, the action of a relay of this type is for all practical purposes instantaneous. There is no operation time lag to be added to the signal transmission time as would be the case if an ordinary relay was used.

# NEW BOOKS

**Physics for Engineers.** By Sir J. Ambrose Fleming. Pp. 228; figs. 89. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 7s. 6d.

The experience of both physicists and engineers engaged in industry proves that physics and electrical engineering are complementary to such an extent that progress in one can be impeded by lack of knowledge of the other. This book sets before the engineer a valuable account of physical principles, as well as the direction in which new advances have been made.

The first of fifteen chapters opens with a thorough explanation of fundamental units, which is a wise step. This is followed by a detailed description of the " atoms of electricity " —electrons, positrons, neutrons and protons, which is later used to elucidate the structure of matter. Radioactivity, isotopes, positive rays, electrostatics, radiation and quantum theory are then lucidly treated. Of special interest are the sections on thermionic and photo-electric emission, valve applications, electron-optics and supersonic vibrations—all " red hot " subjects of modern research. The final chapter is devoted to atomic structure and the disintegration of the nucleus, in which the cyclotron is well described. This latter is a splendid example, if such were needed, of the results obtained by combining engineering and physical knowledge.

The subject is well conceived and admirably presented. The interest of the reader is heightened by the historical approach as well as by the excellent diagrams, though it is a pity that no room was found for the experiments of Lawrence and Dunnington on the nature of an air spark. Though written primarily for engineers, it will appeal to physicists as a useful refresher course. The masterly way in which concepts are illustrated by practical examples is most helpful in fixing a clear picture in the mind. The book can be strongly recommended and is sure to be welcomed by all students of engineering.—L.J.

**Electrochemistry and Electrochemical Analysis**—Vol. III: Electrical Methods Applied to Titration, Moisture Determination, and pH Measurement. By Dr. H. J. S. Sand. Pp. 118; illus. Blackie & Son, Ltd., 1941, 66, Chandos Place, W.C.2. Price 5s. 6d.

The first volume published in 1939 dealt with electrochemical theory, the second with applications of the theory to gravimetric electro-analysis, while the present volume extends the theory in order to apply it to methods of titration, moisture determination and pH measurement. The primary aim is to give analysts as complete a survey of electrochemical methods and principles as possible, so as to enable them to choose for themselves such tests as may be applicable to their special problems. At the same time all three volumes are intended to be intelligible and helpful to students.

The first section of Vol. III gives a highly detailed and practical account of the problems involved in detecting the end-point of titrations by potentiometric means. The opening chapter concisely states the theoretical reasons for the existence of an inflexion in the electrode-potential graph at the end-point and paves the way for applications of the Law of Mass Action in various types of titration. Conciseness, however, may occasionally lead to a slight weakness from the student's viewpoint, as in the skimming over of the reason for the validity of the approximation in the equations on page 4.

Apparatus and methods are discussed in the second chapter, in which an unusual amount of helpful experimental detail is given. The third chapter is perhaps still more useful, providing operational hints in actual examples, including 21 cations and 27 anions, also an analysis of a chromium-vanadium alloy.

Section II deals more shortly with conductimetrical and dielectric-constant methods of analysis. Section III briefly outlines methods of estimating the moisture content in tobacco, tea, etc., by means of capacitance measurements. The chief subjects of the last section are pH determinations and glass electrodes. There is every reason why this volume should be welcomed as eagerly as were the first two.—B.H.

**Accumulator Charging.** By W. S. Ibbetson Seventh edition. Pp. 165; figs. 42. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 6s.

As the subject-matter of this useful little handbook is based largely on principles of operation and construction rather than being descriptive, no extensive additions have been considered necessary to the contents of the new edition which has been brought out to meet a continued demand.

# Infra-Red Radiation—II

## *Design Factors and Practical Considerations*

By A. E. Tooke, B.Sc., A.Inst.P.
*and*
H. W. C. Gatehouse, Grad.I.E.E.

IN the first article on this subject (ELECTRICAL REVIEW, January 30th) we dealt generally with the principles of infra-red heating and described a number of actual installations for drying purposes in the United States.

The main problem which faces the prospective user of infra-red radiation for industrial processing concerns the type and size of the installation required for the particular application. In the present state of the art it would appear that while a general idea can be obtained from published data already available, final designs can only be settled by testing each application specifically, and carrying out tests based on the particular process and the concomitant operating conditions.

The Utilities Research Commission (an organisation sponsored by the Commonwealth Edison group of companies in Chicago, U.S.A.) undertook in 1939-40 a study of infra-red heating with the object of making a contribution towards establishing the design of infra-red applications on a more scientific basis than hitherto. A statistical analysis was prepared concerning all installations sold by the Commonwealth Edison Co. up to May, 1940, and also concerning the experiments on a number of manufactured articles submitted to the company's laboratory up to that time—a total of sixty operations in all. This was published in the *Electrical World* of April 5th, 1941.

The work includes recommendations on lamps, reflectors, finishes and heat energy concentrations (measured in watts per sq. in.). It is believed that as more energy concentration data of this type become available, unknown factors will be progressively eliminated and engineers will be able to use them to judge whether operations are suitable for the infra-red process and to decide on the various installation characteristics without constant repetition of tests.

Calculations are useful, however, in determining the general practicability of a proposed application and in estimating the wattage required. Thus, in designing a drying tunnel for baking paint, three factors at least must be determined: (*a*) cross-sectional dimensions of tunnel, (*b*) wattage and spacing of lamps, and (*c*) length of tunnel.

The cross-section of the tunnel depends upon the shape and size of the largest object to be baked. The distance from the reflectors, or lamps, to the work should be about 6 to 18 in. depending on the reflector and the requirements of uniformity of energy. The wattage and spacing of lamps depend upon the wattage per sq. in. required for a given job and by the efficiency of the reflecting unit. The wattage can be estimated from fig. 1 or can be determined by experiment. The spacing of the units to obtain the desired value of watts per sq. in. can be estimated from the chart (fig. 2). These figures are reproduced, with acknowledgments, from *Illuminating Engineering*, January, 1941.

The length of tunnel required for a given job depends upon the time required for drying and the production rate in feet per minute. Multiplying the time in minutes required to bake the finish to the necessary degree of hardness by the conveyor speed in feet-per-minute gives the tunnel length in feet.

In the case of "mass heating," such as the heating of parts for shrink fits, preheating of materials for processing, etc., as distinct from paint baking, the chart in fig. 3 can be used for calculating the kW required.

The three types of instruments available for the measurement of total radiation are the thermopile, bolometer and radiometer. For measurements in infra-red installations the thermopile has been found to be very practicable. It consists of a series of thermo-junctions, one half of which are exposed to the radiation (hot junctions), the other half being shielded from the radiation (cold junctions). A galvanometer or micro-ammeter is used to measure the thermal e.m.f., which is proportional to the density of the

**Pedestal drying lamps for garage repairs (Westinghouse)**

radiation. In a practical arrangement for infra-red installations, the thermopile and indicating instrument are calibrated in watts per sq. in., which is the unit of flux density used in radiant heating.

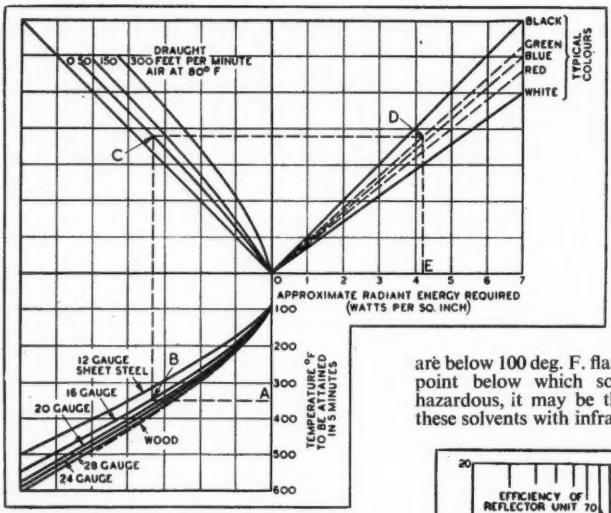



**Fig. 1.—Energy estimating chart for paint baking.**

To determine approximate radiation concentration start with a given temperature at A (say, 350 deg. F.), proceeding clockwise to gauge of metal or wood at B (say, 16-gauge sheet steel), then to draught on work at C (say, 50 ft. per min.), then to colour at D (say, green), and finally to answer at E, in this case 4.2 watts per sq. in.

A convenient form of instrument using a thermopile has been developed by the Utilities Research Commission (fig. 4). This instrument is calibrated by means of a light source of known energy output, actually in this case a 1,000 W incandescent lamp.

## Degreasing Surfaces

Successful application of various paints depends upon the absolute cleanliness of the surfaces to which they are to be applied. This is particularly true when infra-red baking is to be used.

In this connection, to assure perfect cleanliness, particularly from grease, the Thermador Electrical Manufacturing Co., Los Angeles, has developed an electrically heated "degreasing" tank in which all parts to be painted are first dipped. The degreasing tank contains a solution of carbon tetrachloride and other materials having a low boiling point, maintained at a uniform temperature of 140 deg. F. Over the surface of the cleaning fluid there is a layer of cool water, maintained at constant level by a pump, which prevents the vapours being carried off into the room. The solution cuts the grease in about 30 seconds, and the rise in temperature of the part immersed is such that the heat dries off the water immediately.

## Fire and Explosion Risks

Experiences of American engineers indicate that fire hazard is remote when using infra-red rays for finish baking under ordinary operating conditions. The solvents usually used in the application of synthetic industrial finishes have flash points of from 50 to 80 deg. F. and because they are below 100 deg. F. flash point, the recognised point below which solvents are considered hazardous, it may be thought that the use of these solvents with infra-red heat creates a fire

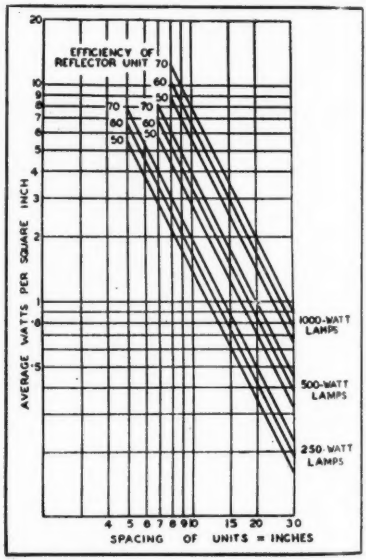



**Fig. 2.—Lamp bank spacing chart for desired concentration.**

These data are for staggered lamp arrangement; when reflectors are mounted in square pattern concentration of energy will approximate to 87 per cent. of that obtainable with staggered banks

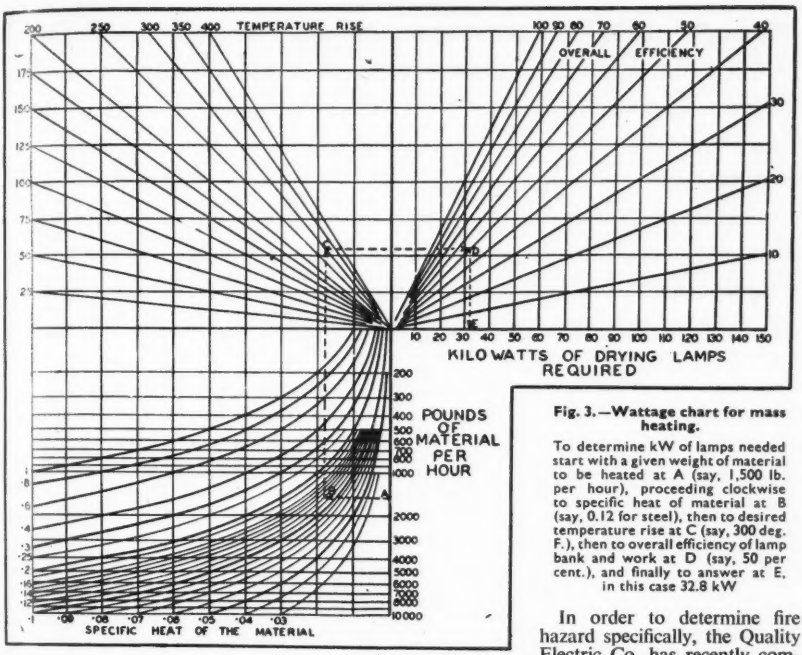



**Fig. 3.—Wattage chart for mass heating.**

To determine kW of lamps needed start with a given weight of material to be heated at A (say, 1,500 lb. per hour), proceeding clockwise to specific heat of material at B (say, 0.12 for steel), then to desired temperature rise at C (say, 300 deg. F.), then to overall efficiency of lamp bank and work at D (say, 50 per cent.), and finally to answer at E, in this case 32.8 kW

or explosion hazard. This type of equipment is, however, almost always used in the open, and as the reflectors are mounted on skeleton framework and not enclosed as in the conventional type of baking oven, there is very little possibility of a concentration of the solvent fumes driven off in the baking process, or of a sufficiently rich mixture to form with the surrounding air to create a fire or explosion hazard.

In order to determine fire hazard specifically, the Quality Electric Co. has recently completed an exhaustive series of tests under conditions infinitely more severe than those of ordinary operating conditions. From these it appears conclusively that there is no fire or explosion risk in using infra-red equipment.

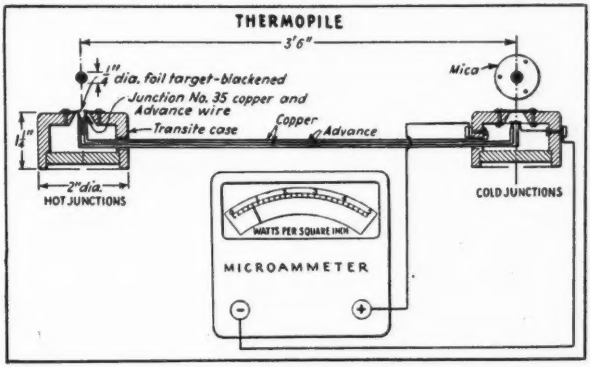



**Fig. 4.—Thermopile circuit diagram for measuring radiant energy concentration (watts per sq. in.) on material under drying lamps**

Also, it appears that in most tunnels the natural convection currents give more than sufficient ventilation. If, however, the room is not well ventilated or large enough, forced ventilation may be required.

Regular maintenance of reflectors appears to be imperative in order to maintain a reasonable efficiency. This is particularly important in paint baking where reflectors are

directly in the path of vapour or paint dripping. One method of cleaning gold-plated reflectors which has been reported is to apply the solvent used in the painting operation, along with a small amount of lamp black, by means of a cotton pad. When dry the reflectors are polished with a soft cloth. Another method is to remove the reflectors and dip them in a 10 per cent. caustic solution.

Several advantages are claimed for the infra-red process. The first, as we have shown, is the substantial saving in time which it secures. The drying lamp is an instantaneous source of heat, thus eliminating the customary warm-up time for convection ovens and the heat loss before and after the actual period of operation. An infra-red installation can be built into the production line, and the semi-permanent construction permits utmost flexibility for plant changes. Other advantages claimed are less initial cost, since no elaborate insulated ovens are required; ease and flexibility of control; convenience, as portable units are available; and compactness.

The practicability and advantages of the system are now firmly established and it seems clear that it provides a method for eliminating the bottleneck in many production programmes which is presented by the heating of materials and equipment for drying, and other purposes, a factor which is of increased importance during wartime. A complete study of the details of the mechanism of radiant heat drying could usefully form a subject for post-war research.

# America and the War

## *Restrictions on Manufacturers*

MUCH had already been done in the United States to prepare for eventual participation in the war, but the actual entry has been accompanied by the introduction of many new measures. A good idea of the situation in so far as it concerns the American electrical industries is given by recent issues of our New York contemporary the *Electrical World*.

In its first wartime issue this journal calls for a cessation of all internal dissensions and for all necessary sacrifices. "There is no question but what individuals and businesses will be called upon to make sacrifices greater than anything probably we have known. This we will do willingly because it is our country that has been attacked." The editorial concludes with the words:—"Let us take a leaf out of the experience of England and not be stampeded—let us be steady."

### Reduced Lighting

On the Pacific Coast there seems to have been no general black-out. Upon the occasions of the air-raid warnings in the first day or two of the war although street lighting and other circuits controlled by the San Francisco utility were cut out, signs and lights in commercial and residential premises continued to blaze away, as well as the floodlighting in the two largest shipyards. Better results were secured in other districts although it appears that the black-out process occasionally took quite an appreciable time—twenty-eight minutes in Watsonville.

Arguments against complete black-out of cities are again put forward by Dr. S. G. Hibben, of the Westinghouse Electric & Manufacturing Co., and I.E.S. representative on the National Technological Civil Protection Committee. Saying that complete darkness increases traffic accidents and disrupts production, he considers that black-outs should be planned to conceal simply those prominent targets or to confuse those "map patterns" that would be distinctive signposts to raiders.

### Restrictions on Extensions

It has been ordered that no public or private utility undertakings may initiate projects duplicating facilities of others. All proposed extensions must be submitted for approval, in advance, to the Office of Production Management. Material must not be used for extensions without O.P.M. approval unless they are "40 per cent. complete." Exemption is granted to line extensions costing less than $500 overhead or $1,500 underground which do not extend more than 1,000 ft. from present facilities.

The use of material in stock for repairs, maintenance, etc., is limited to the value so used in the corresponding quarter of 1940 or to a fourth of the 1940 total at the utility's option. The use of an extra 2 per cent. of materials may be sanctioned to meet "unavoidable or emergency situations."

Restrictions are also placed on the purchase of meters by utilities. They may not purchase and use in any quarterly period more than a quarter of all meters condemned or destroyed in 1940, plus the number of meters necessary to serve the net increase in customers.

### Cuts in Production

Further reductions in the permitted volume of production of domestic appliances have been made. Revising an earlier order, the Office of Production Management has directed manufacturers of refrigerators to cut their production during January and February from 30 to 52 per cent. below the monthly average for the year ended June 30th last.

The cut in washing machine production has also been increased. The reduction for February ranges from 5 per cent. for the smallest manufacturers to 40 per cent. for the largest. In compensation the industry is to be given additional war contracts; it is already sharing in a large order for machine-gun mountings.

An O.P.M. order applying to the first quarter of this year imposes an average cut of 35 per cent. in the use of iron and steel by producers of ranges, stoves, hotplates, etc. This reduction is also scaled down for the smallest concerns. In addition those manufacturers are now forbidden to produce iron or steel cover tops or lids over cooking surfaces and all bright work using copper, nickel, chromium, aluminium or their alloys.

# INSTITUTION PROCEEDINGS

## *The Dowser's Art. Wireless Section Paper.*

## Water Divining

INFORMAL meetings of the INSTITUTION OF ELECTRICAL ENGINEERS in London were recommenced on January 26th, when Mr. J. F. Shipley opened a discussion on whether there was an electrical basis for water divining. He presented the claims, methods and instruments of water diviners, and touched on the possible electrical causes of the effects claimed.

All the data presented were taken from the published statements of the diviners themselves, and these included a comprehensive list of claims which the opener analysed, and which on the whole were short cuts for avoiding expensive and tedious searches for highly valuable materials, documents or information. The diviners had stated that instruments were immaterial, but when used took the form of a rod, of which the shape, size, material and grip were unimportant. There was no agreement as to the type or extent of motion stated to be caused by water, either on the rod, pendulum, or person.

### Earth Currents

The diviners, in contradistinction to other comprehensive claims, were only affected by liquid water that was underground. Many diviners maintained that the effects claimed were caused by magnetism or electricity in some form or other and a review of possible causes was given. There were earth currents which existed permanently and were varied or increased by the presence of fog, dust, or clouds in motion. They totalled approximately 1,000 A for the world's surface in normal fine weather, but local currents, such as lightning storms, greatly increased this figure. There was the ionospheric continuous current at a height of about 70 km., which amounted to 200,000 A at the poles, increasing to more than double occasionally, which was responsible for the earth's magnetism. There were stray currents from power and telegraph installations.

There were only two forms of natural current in the earth, one caused by spontaneous electrification owing to the oxidisation of a sulphide ore body in the presence of moisture, while the other was the natural earth current system. This was alternating with a periodicity of two per day. During magnetic storms it caused interruption to communications, and in one case to power transmission on a large scale. The effects of various forms of radiation, particularly from the physiological aspect, were reviewed.

Eighteen speakers contributed to the animated discussion.

## Industrial X-Ray Analysis

THE INSTITUTE OF PHYSICS is arranging a conference on "X-Ray Analysis in Industry" to be held in Cambridge on April 10th and 11th next. Its purpose is to promote the interchange of knowledge and experience between those employing X-ray analysis (diffraction methods) in their work in different fields and to arrange for further collaboration between physicists, engineers, chemists and others towards the solution of problems by its methods.

During the conference the president, Professor Sir Lawrence Bragg, will lecture on "The History and Development of X-Ray Analysis." Further particulars can be obtained from the Secretary of the Institute of Physics, at The University, Reading, Berks., to whom application for accommodation in Cambridge should be made before February 14th.

## Time-Base Development

VARIOUS types of time bases employing hard and soft thermionic valves, both for general and special purposes, are dealt with in the paper by Mr. O. S. Puckle (A. C. Cossor, Ltd.) that was read before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 4th.

Since the *development* of time bases is considered it follows that several instruments mentioned have been described elsewhere, but the purpose of the paper is to elucidate the principles involved in the wide variety of known time base circuits, rather than to attempt a detailed description of the actual instruments. Except for a few special remarks the application of the time-base potentials and currents to the cathode-ray tube are not discussed, and for this reason the electromagnetic time bases which have been evolved for television purposes are, in general, omitted from the paper. For similar reasons time bases which are solely applicable to high-voltage cathode-ray tubes are not considered.

Several devices which are not generally known are described, and the technique of producing and controlling pulses is also considered since this has become of prime importance in many time-base applications.

### Deionisation Time

The results of a recent investigation into some peculiarities of the gas-discharge triode are presented in the form of an appendix.

In conclusion it can be stated that (at least in the case of gas-discharge triodes, argon-filled, used as discharger valves) the original idea that deionisation time is alone responsible for the failure of the time base to operate at frequencies greater than about 40 kc/s. is erroneous. The limitation is actually due to the necessity for reducing the charging current as the capacitance is reduced in order to obtain extinction of the discharge. If extinction can be obtained by other means, deionisation time may be expected to become a limiting factor. It should be noted that deionisation time depends upon the circuit conditions as well as upon the valve, since the time required for ionic recombination depends upon the electrode potentials.

The traditional explanation of the process of ionisation appears to be incomplete in that evidence has been brought to light during the investigation described in the appendix which shows that the anode falls to the neighbourhood of zero before becoming stabilised at the ionisation potential.

The use of the term "frequency" in connection

with a time base is misleading unless the amplitude of trace and the ratio of trace to fly-back time are specified. In the author's opinion the best way to specify the behaviour of a time base is to refer to trace-time, voltage amplitude and time ratio with respect to the fly-back.

## Forthcoming Events

**Institution of Electrical Engineers.**—Thursday, February 19th, 6 p.m. London. Paper: "The Electric Spark," by Mr. J. M. Meek, M.Eng. Monday, February 23rd, 6 p.m. Informal meeting. Discussion on "High-rupturing-capacity Fuses and Circuit-breakers," to be opened by Mr. A. R. Blandford.

*Transmission Section.*—Wednesday, February 11th, 12.45 for 1 p.m. Holborn Restaurant, W.C.1. Informal luncheon (tickets 7s. each). On the same day (6 p.m.) the February Section meeting will be held, at which Mr. B. Wood, M.A., will read a paper on "City Distribution by Solid Low-Voltage Networks."

*Installations Section.*—Thursday, February 12th, 6 p.m. London. Inaugural address of Mr. H. T. Young as chairman (postponed from beginning of session), and paper on "The Application of Electricity to the Annealing of Glass Bottles and Containers," by Mr. E. S. Morris.

*North-Eastern Centre.*—Monday, February 9th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Paper: "Field Measurements of Insulation," by Messrs. E. A. Burton, J. S. Forrest, M.A., B.Sc. and T. R. Warren, M.A., B.Sc.

*Dundee Sub-Centre.*—Thursday, February 12th. Paper: "Applications of Electrical Industrial Heating," by Mr. A. F. Fekete, D.Sc.

*West Wales* (*Swansea*) *Sub-Centre.*—Saturday, February 14th, 3 p.m. Exchange Buildings, Swansea. Paper: "Outdoor Bushings for Transformers and Oil Circuit-breakers," by Mr. W. A. Cook.

*Mersey and North Wales* (*Liverpool*) *Centre.*—Monday, February 16th, 5.30 p.m. Liverpool, Royal Institution, Colquitt Street. Paper as for West Wales.

*Irish Centre.*—Thursday, February 19th. Paper: "Small Water-Power Development," by Mr. J. W. Walker.

*North-Western Centre.*—Saturday, February 21st, 2.30 p.m. Engineers' Club, Manchester. Discussion on post-war planning to be opened by Messrs. B. A. G. Churcher, M.Sc., and J. W. Thomas, LL.B., B.Sc. (Tech.). *Students' Section.*—Saturday, February 14th, 2.30 p.m. Lecture: "Telecommunications of the Future," by Dr. W. G. Radley.

*North Midland Students' Section.*—Saturday, February 7th. Problems afternoon.

**Electrodepositors' Technical Society.**—Monday, February 9th, 4 p.m. Northampton Polytechnic, London, E.C.1. Paper: "Current Distribution on Interior Surfaces," by Dr. J. Kronsbein.

**Association of Supervising Electrical Engineers.**—Saturday, February 14th, 12.30 for 1 p.m. Connaught Rooms, London, W.C.2. Luncheon and reunion (tickets 9s. 6d. each). Saturday, February 21st, 2.30 p.m. Lighting Service Bureau, Savoy Hill, London, W.C.2. Lecture: "The Control of Electric Furnaces," by Mr. W. F rdham Cooper, M.I.E.E., Electrical Inspector of Factories.

**Institution of Chemical Engineers,** jointly with the Chemical Engineering Group (Society of Chemical Industry).—Tuesday, February 10th, 2.30 p.m. Geological Society, Burlington House, London, W.1. Paper: "Design and Performance of Cooling Towers," by Messrs. W. K. Hutchinson, B.A., B.Sc., and E. Spivey, Ph.D.

**Association of Mining Electrical and Mechanical Engineers.**—*South Wales Branch.*—Saturday, February 14th. Cardiff. Paper: "Discharge Lighting in Mines," by Mr. C. S. Chubb.

## Mining Research

RESEARCH in connection with electricity in mines during 1940 related mainly to the safety of casings against the passage of flame through flanges under conditions in which pressure-piling might be suspected and to the strength of casings necessary to withstand internal explosions. The nineteenth annual report of the Safety in Mines Research Board (Stationery Office 1s. net) states that in co-operation with the Electrical Research Association further experimental work has been carried out to determine the safe gaps between the flanges of a flameproof casing for various industrial gases and vapours. An investigation showed that the maximum safe diametral clearance with shafts concentric with the glands was about twice that when the shaft was fully eccentric.

Electric motors having the armature built on a spider or having longitudinal holes in the armature assembly are in effect two spaces linked by narrow passages. These conditions are conducive to pressure-piling when ignition of gas in one space causes the explosion to travel into the second space, but no conclusive evidence has been found that pressure-piling affects the safe gaps.

In order to determine the margin of strength by which flameproof apparatus passes an explosion test, experiments were conducted to ascertain the relationship between a strain due to static pressure and the strain due to explosion with the same maximum pressure. It was found that maximum strain produced by methane-air explosions was the same as when an equal pneumatic or hydraulic pressure was slowly applied.

## Static Electricity on Vehicles

ACCUMULATION of static electricity on motor-cars can be reduced by injecting a special conducting powder into the inner rubber tube of pneumatically inflated tyres through the valve stem. According to a report of the United States Rubber Co. to the American Chemical Society two grammes (15 grains) of powder is sufficient to adhere to the inside wall of the inner tube, forming a continuous conducting layer. This does not prevent the generation of static electricity on the tyre tread, which is a frictional effect, but the negative charge built up on the outer tread induces a positive charge on the interior conducting layer of powder. The strong attraction between these two equal charges of opposite sign reduces the resultant charge that would otherwise tend to be accumulated on the body of the vehicle. Road tests are said to have indicated a maximum of 1,200 V, which disappeared quickly when the car was left standing, compared with from 5,000 to 7,000 V generated on cars with tyres not treated in the manner described.

# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

TO welcome home **Miss C. Haslett,** the director of the Electrical Association for Women, who in her capacity of adviser to the Ministry of Labour on woman power has just visited Canada and the United States, the London Branch last week gave a reception at Headquarters. Mrs. A. Leevers, chairman of the branch, expressed members' pleasure and thankfulness at seeing her back in England again, and Miss Haslett then gave a brief account of her by no means uneventful crossing of the Atlantic by sea and air, the busy time she had while she was in the States, the great welcome and hospitality shown there, and a few of the ways in which the two nations could help each other both now and after the war. In particular she thought that Great Britain had a great opportunity at the present moment to give practical help to America by sending out experts on A.R.P. matters including electricity supply.

Two new appointments are announced by Edmundson's Electricity Corporation, Ltd. **Mr. E. C. Mekie** becomes secretary of the Shropshire, Worcestershire & Staffordshire Electric Power Co. and the South Wales Electric Power Co., and **Mr. A. J. Jenkins** is appointed secretary of the Wessex Electricity Co. and the B.C. & H. Power Station Co.

A presentation to **Mr. D. H. Bishop,** who recently retired from the position of general manager and engineer of Dundee Corporation Electricity Department, was made in the Electricity Showrooms on January 28th. Mr. P. Philip, city electrical engineer, asked Mr. Bishop to accept an oak bookcase from the staff and a fountain pen from the electricity station golf club. A concert, over which Convener Baird, of the Electricity Committee, presided, followed. Mr. A. M. Reid, commercial manager, proposed votes of thanks.

Sir **Harry Twyford** has been elected to the Courts of Cable and Wireless (Holding), Ltd., and Cable and Wireless, Ltd., and the boards of their associated companies. He was on the staff of the Eastern Extension, Australasia and China Telegraph Co., one of the associated cable companies, for about twenty years during his early career, and was Lord Mayor of London in 1937-38.

Mr. **E. G. Brooke,** divisional manager in Australia for Cable & Wireless, Ltd., who has served the associated cable companies for many years, has also been elected to the Courts of Cable & Wireless, Ltd., and Cable & Wireless (Holding), Ltd., and associated companies, with the title of "Director Resident in Australia."

**Mr. G. C. Howard,** chairman of the Kalgoorlie Electric Power & Lighting Corporation since 1920, has resigned his directorship owing to advancing years, and **Mr. A. R. Hoare,** M.Inst.C.E., M.I.Mech.E., M.I.E.E., has been appointed to succeed him.

Southend-on-Sea Electricity Committee has placed on record its appreciation of the services rendered by **Alderman S. F. Johnson** during his many years as chairman. Alderman Johnson has been elected chairman of another committee and **Councillor D. G. Verney** succeeds him as chairman of the Electricity Committee.

The Macclesfield Electricity Committee has decided to retain the services of **Mr. L. C. Grant** as consulting engineer for a further period of twelve months.

**Professor G. W. O. Howe, D.Sc.,** has been elected Dean of the Faculty of Engineering for 1942 by the senators of Glasgow University.

**Mr. R. Dodd** has been elected a director of Erinoid, Ltd.

**Sir W. A. Robinson** has been appointed a director of Babcock & Wilcox, Ltd.

Oldham Corporation Electricity Committee has promoted **Mr. B. Sidebottom,** junior charge engineer, to the position of charge engineer.

**Mr. J. Allen Howe** has been elected president of the Institution of Mining and Metallurgy for 1942-43.

## Obituary

**Faraday House Students Killed.**—It is reported that two students of Faraday House, **Messrs. J. C. Grummant-Tarner** and **W. T. Bullimore** were killed when an object which they had picked up on a beach in South-West England exploded in an hotel to which they had taken it for examination.

**Lieut. F. V. Percival,** R.N., aged twenty-six, reported missing, presumed killed, served in H.M.S. *Barham.* Before joining the Navy he was assistant mains superintendent to the Islington Corporation Electricity Department.

**Mr. A. F. Catharine.**—We regret to announce that Mr. A. F. Catharine, manager of the Publicity Department of Worthington-Simpson, Ltd., died on January 23rd, after more than forty-five years in the service of the company.

**The late Mr. G. Tilstone (English Electric Co.) whose death we recorded in our last issue**

**Mr. J. H. D. Brearley.**—The *Electrical Engineer and Merchandiser* (Australia) records the death in Melbourne of Mr. J. H. D. Brearley who designed the Dunedin tramways and was associated with Sir William Goodman in the design of the tramway system in Adelaide. For many years Mr. Brearley was managing director of Noyes Bros., Melbourne, and on the death of Mr. Henry Noyes he acquired the business, remaining in charge until his retirement about a year ago.

**Mr. A. Grove.**—*The Times* reports the death of Mr. Arthur Grove, an electrical engineer who had contributed horticultural notes to its pages for a great number of years.

**Dr. Frank Conrad,** whose death at the age of sixty-seven is reported from Miami, Florida, was a pioneer in radio broadcasting; he was responsible in 1920 for the inauguration of the KDKA

(East Pittsburgh) station, claimed to be the first to radiate regular programmes. He had been assistant chief engineer of the Westinghouse Electric & Manufacturing Co., since 1921.

**Mr. L. Thurner.** — We regret to report the death on January 30th of Mr. Louis Thurner, who had been managing director of Falk, Stadelmann & Co., Ltd., since 1913. He was seventy-three years of age. The funeral took place at Golders Green Cemetery on Tuesday last.

**Mr. F. D. Comerford.**—The death is reported of Mr. Frank D. Comerford, who had been president of the Boston Edison Co. since 1935. He was only forty-eight years of age.

# New Zealand's Power Resources

## *Possible Large Hydro-Electric Developments*

ALTHOUGH the power shortage in New Zealand has been brought about by the war it has nevertheless emphasised the need for long-range planning of schemes for additional generating capacity to meet the rapid growth in electricity consumption. In this connection an interesting survey of the Dominion's great potentialities in hydro-electric development was given recently by Mr. F. T. M. Kissel, B.Sc. (Eng.), A.M.I.E.E., A.M.Inst.C.E., chief electrical engineer and electricity controller of New Zealand, an abstract of which is published in the *New Zealand Electrical Journal*.

Dealing first with the North Island, he said that the Waikato River was the best potential source of power, with a fall of 1,160 ft. between Lake Taupo and the sea. Below Arapuni the scheme under construction at Karapiro (90,000 kW) would utilise practically all the power left, while between Lake Taupo and Arapuni two main schemes were possible. The first would provide for one power station between the lake and the Mangakino Stream (544 ft. fall), the water being brought to it by a 15½-mile tunnel; such a plant would have a capacity of about 280,000 kW. Another 150,000 kW could be developed lower down at sites in the Maraetai Gorge. The alternative proposal was to develop the section between the lake and Mangakino in several independent schemes, possible sites being at Huka Falls, Aratiatia, Chakuri (where proposals had been considered for a 140-ft. dam and plant producing about 100,000 kW), and Whakamaru. In the aggregate these independent schemes would give rather more power than the long tunnel diversion to the Mangakino River, capital expenditure could be distributed over a longer period and production started earlier. Probably the next best power source still available was the Kaituna River, the outlet from Lakes Rotorua and Rotoiti the storage value of which, as with Lake Taupo, was a valuable asset.

### South Island Schemes

In the South Island, besides schemes completed and under construction, a considerable amount of survey work had been carried out on the Waitaki River between the Mackenzie lakes and the sea. Various methods of developing the potential power had been considered, the best sites being in the long length of gorge near the junction of the Ahuriri River. At Black Jack's Point sites for dams of, alternatively, 210 or 290 ft. had been surveyed, providing power to the extent of 200,000 to 280,000 kW. On the other hand lower dams at the Goose Neck could be 148 to 228 ft. high, yielding 144,000 to 200,000 kW. River control works would be necessary at the outlets of the three main lakes, Tekapo, Pukaki and Chau, the power scheme in conjunction with the control at Lake Tekapo being already under way. Towards the southern end of the island the Clutha River offered great possibilities, and a scheme between Lakes Hawea and Wanakea had been discussed for many years, but having regard to the probable distribution of load he thought better schemes could first be secured by utilising sites for dams above Beaumont. Should the major demand be north of Christchurch valuable sources existed on the Clarence River by diverting this from the high country behind Hanmer on to the Hanmer Plains or into one of the branches of the Mason River, providing falls of over 1,000 ft. in either case. The West Coast offered good facilities but had very little lake control; interconnected with the East Coast, however, they would have much greater value.

### Industrial Possibilities

It was well-known that New Zealand possessed, in the south-western corner of the South Island, some very large potential power resources which had at various times been advocated for the development of electro-chemical or electro-metallurgical processes. Two had been surveyed in some considerable detail, the first consisting in tunnelling from Lake Te Anau through to George Sound, a distance of about 7.7 miles and the second of tunnelling through from Lake Manapouri to Doubtful Sound, about 6.5 miles. Between Lake Te Anau and the sea there was a fall of 673 ft. and the power available could be made up to 600,000 HP with a dam 30 ft. high. If this scheme were developed that between Manapouri and Doubtful Sound would depend on the water from the Lake Manapouri drainage area but even so could still have a capacity of 200,000 HP with a dam 25 ft. high at the outlet of the lake. If, on the other hand, the fall of 80 ft. between the two lakes were wasted or developed in a separate scheme, which would not be particularly economical, it would be possible to increase the capacity of the Manapouri-Doubtful Sound scheme to 650,000 HP.

It was, of course, practically impossible under present conditions to give any indication as to what these huge power schemes might cost. From estimates based on pre-war costs, however, it was evident that the capital cost for complete development would be comparatively low, probably £17 to £18 per kW of plant installed. Should a demand for this amount of power be available it could be sold at a very low price, cheap enough to attract special industries to the locality, where deep-water facilities and sheltered harbours were available.

# Public Utilities

## *Annual Meeting of Conjoint Conference*

THE annual general meeting of the Conjoint Conference of Public Utility Associations was held on January 28th, and in the unavoidable absence of the president, Viscount Falmouth, the chair was taken by one of the vice-presidents, Sir David Milne-Watson, Bt.

It is well known that the membership of the Conference consists of the associations of the gas, electricity and water industries. It has been in existence for some eighteen years, during which time the advantages which accrue from united action in matters affecting the three interests in common has been amply demonstrated.

Such matters as rating, mains and cables in highways, public and private legislation have been under the constant consideration of the Conference, and in these and other matters it has been able to speak with one voice on behalf of all the public utilities of the country (except, of course, the railways).

### President's Address

The president in his speech, which was read by Sir David Milne-Watson, stated that the year 1941/42 must be regarded as the most strenuous in the life of the Conference having regard both to the importance and the volume of the work undertaken. He referred to the serious anxiety which had been felt in the early months of 1941 with regard to the coal situation. The optimism of the Mines Department had not been justified, and it had become necessary for the Conference to make direct representations to the President of the Board of Trade urging that immediate action to prevent a further depletion of stocks was essential.

The President of the Board of Trade had suggested that the machinery of the Conference should be utilised, and in accordance with his wishes, the Public Utility Coal Committee was set up as a sub-committee of the Emergency Committee of the Conference. The Coal Committee, which was fortunate in having as its chairman Colonel J. C. Dalton, consisted of two representatives of each of the gas, electricity and water industries, and was able to utilise the existing machinery of the District Advisory Coal Committees. Regular weekly meetings between the Committee and the principal officials of the Mines Department had been held, at which questions relating to the allocation and delivery of coal to all undertakings and the grade and quality of coal supplied had been settled.

The coal position of public utilities had unquestionably greatly improved during the year, and it could not be denied that this was in no small measure due to the labours of the Coal Committee.

The President also referred to the gratitude felt by the Conference to the National Gas and Electricity Committee, which though not the direct offspring of the Conference numbered in its ranks many distinguished Conference representatives. Since its inception it had carried out its work in close collaboration with the Conference. The main task of this Committee had been to demonstrate that the rationing of gas and electricity was wrong in principle, and it could fairly be claimed that this view now prevailed. The Committee had also succeeded in securing the truce to competition between the two industries, which had been maintained ever since.

Special reference was made in the Report to the negotiations which the Conference had conducted with the railway companies with regard to demurrage on coal wagons. These negotiations were still in progress and had been protracted by reason of fact that the railway companies would not admit that claims for demurrage should not be pressed where the delay was due to circumstances entirely beyond the control of the public utilities. On the other hand, the Conference had placed reliance upon the assurance which the Minister of War Transport gave in Parliament—on the approval of the demurrage regulations—that due regard would be given to any genuine difficulties which the trader might have in unloading within the prescribed period.

Other matters relating to coal to which the report referred were (a) the negotiations with certain of the coal districts regarding standard sale conditions and (b) the subsidy granted by the Treasury on coal imported from other districts.

### War Damage

Another question of primary importance was War Damage, and the Conference was in charge of the negotiations with the Government in respect of the application of the War Damage Act, 1941, to public utilities. After the passage of this Act through Parliament, the Treasury submitted to the Conference a scheme for dealing with War Damage suffered by public utilities. In the consideration of this scheme it was decided that each of the three interests should deal directly with the Treasury regarding those matters which were peculiar to its own industry, leaving it to the Conference to make representations to the Government on points affecting the three interests in common. A deputation from the

Conference was received by the Treasury and the various points submitted were still receiving consideration.

The report also referred to the continuance of negotiations with the associations of the highway authorities of the country for the purpose of agreeing to a suitable highway protective clause which would embody the recommendations of the Joint Committee of both Houses on the breaking up of highways by statutory public utility undertakers. It will be remembered that this Joint Committee accepted with certain minor reservations the proposals which were submitted to it by the conjoint Conference.

The president in his speech placed special importance upon the work of the Conference in connection with National Planning and Reconstruction. At the present time two Governmental Committees, one under the chairmanship of Mr. Justice Uthwatt and the other under Lord Justice Scott were considering post-war planning from slightly different angles. Lord Falmouth emphasised the importance of the part that public utilities would play in reconstruction after the war and mentioned that memoranda had been submitted by the Conference to both of these Committees. There could be little doubt that the utilities should be represented on the Central Planning Authority itself.

Turning to domestic matters, the President expressed the sincere regret of the Conference that Mr. William Cash had, on medical advice, felt it necessary to tender his resignation. He voiced the gratitude of the Conference to Mr. Cash for the valuable work which he had performed for the Conference from its inception.

The vacancy caused by Mr. Cash's retirement was filled by the appointment of Sir Francis Fremantle as vice-president.

# CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.*

## Platinum Electrode Construction

IN his interesting review of gravimetric electrolytic analysis in your issue of January 16th, Mr. R. H. Powell, dealing with the construction of platinum electrodes, lends his authority to two statements which, though frequently repeated, have never, so far as I know, been supported by any conclusive evidence. Perhaps you would permit me to comment briefly upon them.

Mr. Powell states that a square-section frame produced by stamping is stronger than one built from wire. If by strength is meant resistance to bending forces from all directions, it can easily be shown that a frame of circular cross-section is stronger than a square-sectioned frame of equal weight. Most stamped frame electrodes have, however, been made only in a relatively heavy section and it is apparently for this reason that the impression of added strength has been gained. In this connection, Mr. Powell does not mention that there are great advantages in using hardened platinum (10 per cent. iridium-platinum or a similar platinum-rich alloy) for frameworks. The greater resistance to permanent deformation which is thereby obtained is found to be very well worth while.

The second point at issue is concerned with welds. Mr. Powell suggests that they are undesirable and refers to "welds at which failure of the frame can take place." Whatever may be the case with welds in base metals, it can be most definitely affirmed that in platinum metals a weld is not a point of weakness. There is no danger of flux or oxide inclusions; and since the thickness is often increased by added metal, the welds in a platinum framework are often the strongest part of the assembly. In a very long experience, extending since the first introduction of platinum electrodes, our repair shops have never been called upon to deal with a framework which has fractured through a faulty weld.

J. C. CHASTON, Ph.D., A.R.S.M.
(Johnson, Matthey & Co., Ltd., Research Laboratories).
*Wembley, Middlesex.*

## Wartime Packaging

BECAUSE of the great amount of material, labour, plant and transport no longer available, the packaging of commodities must be severely modified. Explaining the various methods that are being adopted to overcome the difficulties, Mr. John Ryan, chairman of the Packaging Industry Committee of the British Standards Institution which is tackling the problem, stated at a meeting a few days ago that it had now become necessary to examine carefully the packaging of all commodities with a view to recommending the elimination of packaging materials of all sorts and recommending the most economical sizes for the balance that must be packed. Indeed we had reached the level when the availability of packaging material might be the deciding factor as to whether certain commodities were to be made.

As a result of the situation in Malaya and the possible shortage of tin, the substitution of black plate for tinplate would have to be employed largely, resulting in a less attractive packing, while decoration too would have to be cut to the minimum to save labour and to conserve valuable pigments. It must be emphasised that the changed appearance of the package did not imply any change in the quality of the goods inside. An example of one of the economies being effected in the electrical industry is the use of paper sleeve wrappers instead of cartons for electric lamps.

# COMMERCE and INDUSTRY

## *Domestic Appliance Prices.* *Retail Trade Report.*

### Mobile 132-kV Transformer

A 30,000-kVA transformer which can be transported by road or rail to any part of Great Britain, complete with oil, bushings and cooling plant, has recently been completed by the Hackbridge Electric Construction Co., Ltd., for the Central Electricity Board. The dimensions had to conform to those of an existing 60-ton road vehicle as well as being within all British rail-gauge limits when mounted on selected rail trucks.

The voltage ratio is 132/66-kV with star-star windings and a tertiary winding for harmonic suppression. In the illustration the bushings are shown mounted in inclined pockets, the 132-kV at the far end and the 66-kV at the near end, the perforated metal shroudings being for protection during transport. In spite of the low position of the 132-kV bushings only a very small quantity of oil need be withdrawn when removing them.

**Hackbridge 30,000-kVA 132/66-kV mobile transformer for the Central Board**

At the near end of the unit are also shown the Serck radiator coolers. These incorporate forced-circulation oil pumps and forced-draught fans, the driving motors for which are fed from an auxiliary winding which also supplies low-voltage substation services through a weather-proof fusebox on the tank side. The flat conservator is fitted with baffles to reduce surging of oil during transport. The off-circuit switch is in a longitudinal pocket on the side of the transformer. Pre-drilled steelwork booms can be rapidly fixed to the transformer to take post-type insulators.

### Alloy Specifications

Official specifications for some of the nickel-containing alloys, together with the properties of Monel and "K" Monel and Inconel metals, are summarised in an eight-page booklet obtainable free of charge from Henry Wiggin & Co., Ltd., Grosvenor House, Park Lane, London, W.1. Five classes of metallic resistance materials for electrical purposes (two of which have not yet been specified) are included, such as "Brightray," "Glowray," "Dullray," "Ferry" and "Manhonic," covered by B.S.S. 115.

### Purchase Tax on Appliances

An announcement by the leading makers of electric water heaters and cookers which appears in our advertisement pages gives particulars of revised arrangements for the charging of purchase tax. Goods despatched on and after February 1st will bear purchase tax at the following rates :—Water heaters: Thermal storage type up to and including 30-gal. capacity 27½ per cent. of current list price; immersion heaters and circulators up to and including 3-kW loading 25 per cent. of list price. Domestic cookers: complete cookers 27½ per cent. of list price; oven and grill pans when sold separately as spares 12½ per cent.

### Industrial Overalls

The Board of Trade has now issued a licence to replace the licence (S.R. & O. 1941, No. 1837) under which certain types of industrial overalls might be sold at reduced coupon-values until the end of January. The new licence, which is operative until the end of April, provides that unlined overalls of plain or twill weave cotton material in plain single colour, and in sizes which are chargeable with Purchase Tax may be sold at the coupon values ranging from two for overall trousers or jacket to three for bib-and-brace overall, overall long coat and wrap-over overall, and four for a boiler suit, provided that their price does not exceed a specified value, *e.g.*, 11s. 9d. retail for overall trousers and 21s. 3d. for a boiler suit.

### Torch Battery Prices

The Board of Trade has made an Order under the Goods and Services Price Control Act, 1941, fixing maximum prices for torch batteries made in Great Britain to replace the existing Order made under the Defence Regulations.

The maximum retail prices for batteries made by the larger, long-established British firms named in the original Order are left unchanged except that for the standard flat battery which is increased from 7¼d. to 9¾d. in order to permit the sale of a

better quality battery for which no provision was made. There is, however, no increase in the price charged to the public for the standard flat battery of the usual quality.

The maximum retail prices for batteries made by other manufacturers are unchanged, but maximum wholesale buying and selling prices for these are now prescribed. The retail selling prices are inclusive of purchase tax. Copies of the Order, the Electric Torch Dry Batteries (Maximum Prices) Order, 1942 (S.R. & O. 1942, No. 148) are available from the Stationery Office.

## More "Ediswan" Films

So satisfied is the Edison Swan Electric Co., Ltd., with the results of its film publicity as a means of reaching the general public that it has been decided to double the distribution of films among British cinemas, and in future about a hundred cinemas, representing an audience of well over two millions, will show "Ediswan" lamp films each week. In addition to the five "Signs of the Times" film magazines containing "Ediswan" publicity matter which have been available for some months, three new one-reel films with a running time of about five minutes each have now been produced in the same series. The sections relating to the company's products are included under the titles of "Let's See London," "Let's See Birmingham," and "Let's See Glasgow," the introduction of the "advertising twist" being carried out in the same striking and entertaining fashion as characterised the previous efforts.

## Fuel Efficiency

A meeting convened at the instance of the Mines Department to consider efficiency in the use of fuel was held at Birmingham recently, Sir Bernard Docker, Fuel and Power Controller for the Midland Area, presiding.

Mr. H. L. Pirie, chief engineer of the Coal Utilisation Joint Council, in opening the discussion, mentioned that fuel efficiency classes had been started and the Midland Area would be served by classes at Birmingham, Coventry, Wolverhampton and Stoke.

Mr. F. Forrest, chief engineer of the Birmingham Electric Supply Department, said that the quality of coal had deteriorated greatly since the outbreak of war. Efficiency could not be usefully discussed unless there was a supply of reliable coal. Nevertheless improvements in efficiency at generating stations had been phenomenal in the last ten years and had resulted in substantial saving of coal.

## War Effects on Retail Trade

A second interim report by the Board of Trade Retail Trade Committee has been published (Stationery Office, 6d.). The Committee's first interim report resulted in the Location of Retail Business Order; the present report records the Committee's investigations into the actual conditions in which retail distributors now have to operate and the problems which emerge as the result of war conditions. Attention is paid to the operation of the Limitation of Supplies Orders, the regulation of standard qualities, the control of prices, and the withdrawal of labour. One of the appendices takes the form of a memorandum upon the Liabilities (Wartime Adjustment) Act, 1941.

There is no direct reference to the retailing of electrical appliances, but with regard to radio components the Committee says that since January, 1941, the policy has been to release no materials for new sets although manufacturers were allowed a small amount of steel in order to finish work which was already in progress. From February to July there was a ban on the production of valves for the civilian market, and during this period existing stocks had to be used. Since July production has been resumed, and valves will be made available for maintenance and replacement purposes in 1942, but the number of types will be limited. Arrangements have been made to classify those valves remaining in production so that alternative types will be available in most cases where a particular make or type is difficult to obtain. There may be delay in obtaining certain types where special planning of production has to be arranged to meet Service requirements.

It is extremely unlikely that any new domestic radio receiving sets will be produced for the home civilian market during 1942, but spare component parts will be released for maintenance and servicing. It is believed that until towards the end of 1940 the fall in turnover in this trade was not great. Since then there has been a steady reduction and it has been estimated that supplies to retailers are now at about only 5 per cent. of normal. It is reasonable to suppose that stocks are already low, and eventually the trade will have to depend almost entirely on repair and maintenance work.

## Return of Cutting Tools

The Ministry of Supply has made an Order which requires certain persons carrying on in the United Kingdom any undertaking involving the use of cutting tools for use with machine tools to furnish particulars in the form set out in the Control of Machine Tools (Cutting Tools) (No. 1) Order, 1942 (S.R. & O. 1942 No. 77). The Order came into effect on January 31st and particulars must be furnished to the Controller of Jigs, Tools and Gauges, Machine Tool Control, 35, Old Queen Street, S.W.1, within 15 days from that date.

## Saving Cement Bags

An urgent appeal is being made to clerks of works and builders' foremen to make sure that cement bags are returned for re-pulping. The cement industry uses 75,000,000 of these bags in a year, and of these only about one-third at present find their way back to the mills. This means a loss of 15,000 tons of very valuable pulp. The shortage of paper for cement bags is becoming so acute that the distribution of cement may soon be seriously affected. The bags should not be included in local waste paper collections, but sent only to those mills which produce the special kraft paper of which they are made. The address of these mills can be obtained from Harding & Pogg, Ltd., 52, Grosvenor Gardens, London, S.W.1.

## Electricity Charges Dispute

In the King's Bench Division on January 28th a Court consisting of Justices Wrottesley, Croom-Johnson and Cassels allowed an appeal by the Finchley Corporation from a decision by the Finchley magistrates in the matter of payment for electricity supplied to Carrimore Six-Wheelers, Ltd.

The Corporation claimed £73 in respect of February, 1940, and the magistrates dismissed the complaint, ordering each party to pay its

own costs, on the grounds that there was an agreement by the Corporation to charge on a certain scale, that only £2 was owing, and that the limitations applied and the Corporation was barred from claiming anything.

It appeared that the respondent company was supplied at the normal flat rates for power and lighting. When the flat rates were increased the company suggested certain alterations in charges. The Corporation made an offer but subsequently withdrew it and proposed to charge the flat rates for February. The respondent company had paid the January and March accounts, but challenged the February account.

Mr Justice Wrottesley said that the magistrates were wrong in holding that there had been a new agreement in February, and the case must be remitted to them with that answer. Leave to appeal against the decision was refused, Mr. Justice Croom-Johnson saying that no point of principle was involved.

## Scottish Contractors' Year Book

The 1942 edition of the *Year Book and Diary* of the Electrical Contractors' Association of Scotland has just been published and is obtainable from the Association at 55, Frederick Street, Edinburgh, at 3s. (3s. 6d. post free). It contains a great deal of information of interest to Scottish electrical contractors, including articles on model conditions of tender, Central and South of Scotland Electricity Schemes, regulations for contracts for building works in Scotland, and measurement of electrical work (Scottish mode). The objects and scope of the Association are explained, and there are directories of electrical trade associations, institutions and associations, architects, and a list of members of the Association. There is also a list of Scottish electricity supply undertakings containing particulars of the systems of supply and electricity charges and a "Where to Buy" section.

## Flameproof Gear

The customary quarterly schedule of electrical equipment, mining and industrial, for which certificates of flameproof enclosure have been granted by the Mines Department of the Board of Trade during the three months ended December 31st, 1941, has been issued. At the request of B.E.A.M.A. a few copies are obtainable for 1s. 2½d., post free, from the Mines Department, Heyhouses Lane, Lytham St. Annes, Lancs.

## E.A.W. Activities

Discussions on the subjects of "Electrical Housecraft Instruction in Schools," "Careers for Women in the Electrical World" and "Training for Citizenship" are included in the spring programme of the London Branch of the Electrical Association for Women. The annual general meeting of the Branch will be held at E.A.W. headquarters, 20, Regent Street, London, S.W.1, on Thursday, February 12th, at noon.

## Fatalities

An inquest was held on January 26th, at Birmingham, on Janet Milne (18), of 78, Baldwin's Lane, Hall Green, Birmingham, who received a fatal electric shock while in her bath. It was stated that an electric health lamp fell into the bath. The verdict was "Accidental death."

Harry Grindley (35), an electric fitter, at Stoke-on-Trent, was found lying near a "live" switch at a new substation with his clothing on fire, and died in the Royal Hospital, Wolverhampton, on January 21st. At the inquest it was stated that he had received a shock at 87,000 V. A verdict of "Accidental death" was recorded.

The death of a lay brother, Thomas Anthony Costigan (34), at Mount St. Bernard Monastery, was the subject of a recent inquest. Br. Paschal Buckley stated that he was working with Br. Joseph (Costigan) putting an electrical extension from the greenhouse to the stoke hole. While he was going to get a nail he heard Br. Joseph shout and found him holding the cable with a pair of steel pliers. Witness snatched the cable from him, and he sank to the ground. Fr. Wilfred said that Br. Joseph had done considerable electrical work at the monastery. There was a main switch in the greenhouse and he must have forgotten to switch it off. He might have thought it was off because it had not been used lately. It was stated that artificial respiration was applied for several hours. The coroner said he was satisfied that it was a pure accident.

## Collection of Scrap Metal

The Minister of Works and Buildings is issuing an Order requiring owners and occupiers of certain premises to notify him of any metal suitable for scrap upon those premises at a specified date. It will cover among other things all disused machinery.

## Trade Announcement

Baughan & Co., Ltd., electrical engineers, of Reading, inform us that they are closing down their business for the duration of the war.

## Change of Address

McClure & Whitfield, electrical and radio engineers, have transferred their business from 18 to 89, Mill Street, Macclesfield.

## Diary

We have received from Elliott Brothers (London), Ltd., a neat pocket diary bound in dark blue leatherette which includes a number of useful electrical tables.

# TRADE MARK APPLICATIONS

AMONG recent applications for British trade marks are the following, objections against which may be entered within a month of January 28th :—

BURO. No. 612688, Class 7. Electrically driven tools (not being machine tools).—Bureau of Manufacturers, Ltd., 1 and 3, St. Paul's Churchyard, London, E.C.4.

MARCONATOR. No. 616031, Class 9. Radio navigational instruments.—Marconi's Wireless Telegraph Co., Ltd., Electra House, Victoria Embankment, London, W.C.2. To be associated with No. 521638(2808) xviii and others.

HERCULACKER. No. 616040, Class 17. Varnish for electrical insulation purposes, and lacquered electrical insulation sleeving.—Concordia Electric Wire Co., Ltd., Trent Mills, Derwent Street, New Sawley, Long Eaton, near Nottingham. (By consent.)

TECTO. No. 616,725, Class 17. Insulating tapes for cables and tape for sealing and binding cables.—Herts Pharmaceuticals, Ltd., Bessemer Road, Welwyn Garden City, Herts. (By consent.)

# Control of Quality

## *The Need for an Approval Scheme*

By F. E. Butcher,
Assoc.I.E.E.

ALL electrical engineers worthy of the name, feel that there is something wrong when they see obviously poor quality goods on sale in the chain stores and cheap shops. That there is a good deal of feeling on this subject, is borne out by the letters appearing in the correspondence columns from time to time. I agree wholeheartedly that it is very undesirable that the general public should be able to obtain this inferior material so easily, and sooner or later this is a problem that must be faced and solved. I therefore give the following résumé and suggestions, based on experience in other countries, some of which are satisfactorily overcoming the difficulties involved.

Very often the suggestion is made that all vendors of electrical equipment should be licensed or registered in some way or other. This is not, to my mind, the best way, or even a good way, of obtaining the desired result. The following points must be borne in mind:—

**The author repeats the arguments for the establishment of means of approving electrical appliances and puts forward some further considerations**

(1) Not all the goods sold by the chain stores and cheap shops are of inferior quality (some of the material obtainable is really quite good). Let us admit this, however grudgingly.

(2) Too great a restriction of sales might have a throttling effect on load development.

(3) Strong financial interests would fiercely oppose changes which might completely take away from them a profitable part of their business, and a battle on these lines is the last thing that we wish for.

(4) Electrical engineers are concerned to see that all electrical goods sold are of good quality: who sells them is not really our affair.

(5) Registration of dealers would not of itself ensure the elimination of poor quality goods.

### Standard Requirements

Control of quality should take place at the manufacturers' or importers' end. Anyone purchasing an electric motor or generator, nearly always refers the manufacturer to the appropriate Standard Specification; these Specifications in their sphere have come to be accepted as representing good practice. Something along the same lines, but in a more general way, is required to cover all domestic and similar equipment likely to be bought by people not in a position to stop and ask about its suitability for the purposes for which it is supposed to be intended.

The Underwriters' Laboratory idea as operated in America is good, but does not take the matter quite far enough for the purpose in view. A body must be set up, or perhaps grafted on to the N.P.L. or B.S.I. to act as a testing authority, to grant the use of an approval mark. The granting of the approval mark would allow the manufacturers to make, or the importers to obtain, the goods for sale through the usual channels. Sale of goods without the mark, or unauthorised use of the mark, should be made an offence in law. Manufacturers could be traced by making the use of a trade mark compulsory. Ultimately, unmarked goods, when found by inspectors, would be confiscated irrespective of whether they were in the possession of the seller or user, and further sales prohibited. The help of the police and the courts would naturally be available for the enforcement of these conditions.

Obviously small beginnings would have to be made, and the first items covered could be plugs, sockets, switches, lampholders and adaptors, later on extending to such things as cookers, motor-driven apparatus, etc. The tests could be carried out in specially equipped laboratories, or another less satisfactory way would be to accept manufacturers' certified test sheets.

### Already in Operation

These suggestions are not just wild imaginings. Every one of the foregoing points is in force (in peacetime) in one country or another, and I have been privileged to witness them in operation. The inside story amplified by the officials responsible for these ventures shows sound and honest progress. The cost is exceedingly small. A tax of one quarter of one per cent. on sales of manufacturers and importers is sufficient and would probably be more than enough to cover the expenses of the body, and would be quite easy to collect. In the countries where a beginning has been made, it is significant that the schemes began around the nucleus of certain power companies insisting that " unapproved " apparatus should not be connected to their mains.

I realise that to obtain the necessary powers, an Act of Parliament would be essential, and in at least one country this has already been done. Nevertheless, it should be possible for the electrical industry to have a workable

scheme ready and even in operation in a similar way, for example, to the British Standard Specifications or the I.E.E. Wiring Regulations.

It is evident that sooner or later some control of appliances will be very necessary, quite apart from the control of the actual installations, and the sooner it is begun the more easily it will be possible to take care of the eventual flood of new devices. I think it safe to assume that there would be no opposition from the reputable manufacturers.

An international arrangement could be come to so that approval in one country would mean, so far as possible, automatic approval for the others. A minor difficulty here is that some manufacturers might object to making equipment suitable for both the arctic and tropics, when it obviously was for use in this country only. This attitude, however, would not, in my opinion, be the correct one, especially if the export potentialities are to be realised. All small apparatus manufactured should be capable of being put to reliable use anywhere in the world where electricity supply is to be found, and experience has generally shown that where this policy has been intelligently pursued, the extra cost is negligible.

A few instances of the sort of thing that must be corrected are—110-V radio sets with resistances in the flexible cord for operation on 230V. Electric fires (radiators) that scorch the floor or carpet. Apparatus with live parts that can be touched with the fingers when they are alive or rotating, and equipment that will not stand a 1,000-V flash test.

# ELECTRICITY SUPPLY

## *Leatherhead Debentures Repaid. South African Sabotage.*

**Guildford.**—FURTHER REBATE.—An indication of the success of the Council's " Cut Off the Peak " campaign is the recommendation by the Electricity Committee that a further rebate of 20 per cent. shall be made on consumers' accounts. This concession relates to the March quarter and will be subject to the chairman's being empowered to amend or cancel the rebate in consequence of any unforeseen circumstances.

TRANSFORMERS.—The Committee is to install two transformers at the power station at a cost of £550.

**Hull.**—FINANCIAL POSITION.—When the annual estimates were presented to the Electricity Committee the general manager (Mr. D. Bellamy) said it was estimated that the net revenue surplus would be sufficient to meet necessary appropriations without any increase in existing tariffs and without calling upon the reserve. During the past few years the reserve fund had been satisfactorily increased and could meet any temporary emergency. The chairman of the Committee (Councillor T. R. Broadbent) remarked that it was to the credit of the undertaking and management that there had been only a 5 per cent. increase in charges during the war.

**Kettering.**—LOSS ON YEAR'S WORKING.—The report of the district auditor shows that there was a net loss of £3,455 on the electricity undertaking for the year ended 31st March, 1941, compared with a deficit of £4,041 for the previous year.

**London.**—J.E.A. REPAYS DEBENTURES.—The Finance Committee of the London & Home Counties J.E.A. reports that the £101,000 of 5½ per cent. debentures for which the Authority assumed liability when it took over the Leatherhead & District undertaking have been virtually repaid. The balance outstanding, £95,000, was redeemed with the exception of one or two cases at the close of last year and the saving to the Authority in interest charges for the year is approximately £1,950.

HAMMERSMITH.—At last week's meeting of the Borough Council the Executive Committee reported that after negotiations dating from early in 1939 it had approved a statement of the financial adjustments to be made in connection with the bulk supply of electricity to the Brentford and Chiswick Council.

ISLINGTON.—The borough treasurer has been authorised to transfer an undisclosed amount from the net surplus of the electricity undertaking for the relief of the borough rates.

FULHAM.—The Emergency Committee has arranged for the Electricity Department to improve lighting in shelters at a cost of £2,500.

POPLAR.—An application by the Fixed Price Light Co., Ltd., to vary the scale of charges in excess of those permitted under the terms of the agreement with the Council was recently considered by the Electricity Committee, which recommended that the application should not be granted.

ST. MARYLEBONE.—The Emergency Committee has approved schemes for heating and ventilating shelters at a cost of £3,317.

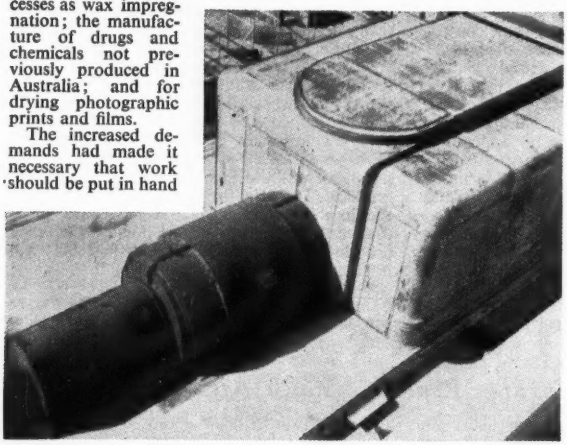
**Portland.**—SHELTER HEATING CHARGES.—An application for the heating of wardens' posts to be at the " off-peak " rate of 0.535d. per kWh was recently considered by the electricity committee. Since the heating was required for the full 24 hours each day it would be necessary to purchase special meters costing £8 10s. each, and to save this expense it was agreed that a special flat rate of 1¼d. per kWh (minimum consumption 2,500 kWh per annum) should be offered, subject to the installed heating not exceeding 2 kW.

### Overseas

**Australia.**—NEW INDUSTRIAL PROCESSES.—Surveying the year's activities of the Adelaide Electric Supply Co., Ltd., at the recent annual meeting of the company, the chairman, Mr. J. S. Murray, said that the war had brought industries to Australia unthought of a few short years ago, and the company's staff had been called upon to solve many technical problems. Infra-red drying, which he thought would be quite a feature of future industrial processes, had overcome many difficult problems for a number of manufacturers. The company's staff had designed electric furnaces

for the heat treatment and melting of metals and special alloys, and electricity was also being used for such processes as wax impregnation; the manufacture of drugs and chemicals not previously produced in Australia; and for drying photographic prints and films.

The increased demands had made it necessary that work should be put in hand on a new power station, but it was unlikely that this would be in commission before 1945. To indicate the extent of electrical development he pointed out that of the new houses built during the year 45 per cent. were being equipped with electric cookers, 39 per cent. with gas, 6 per cent. with wood and paraffin stoves, and in the remaining 10 per cent. the method of cooking had not been decided.



**10,000-kW outdoor turbine installation at Burbank, California**

The report of the directors (the managing director and chief engineer is Mr. F. W. H. Wheadon, M.I.E.E., A.M.Amer.I.E.E.) shows that the total sales rose by 16 per cent. to 173 million kWh and 2,664 new consumers were added. Altogether in an area of 4,116 sq. miles with a population of 341,000 the company has 107,649 consumers. At the date of the report 270 of its 1,300 male employees had enlisted for service overseas, and three had been killed in action.

**Canada.**—PLANT EXTENSIONS.—The Quebec Government has given its approval to plans of the Aluminium Co. of Canada to spend $30,000,000 on the expansion of its hydro-electric facilities in the Lake St. John-Chicoutimi district. The company plans to build a mile-long channel 400 ft. wide from its dam at Chute-a-Caron to the mouth of the Shipshaw River for a second power development there. The Shipshaw plant is expected to produce 820,000 HP compared with the 265,000 now produced at Chute-a-Caron. An official of the company explained that work was already well under way on this development.

**Germany.** — MANUFACTURE OF HEATERS BANNED.—The manufacture of electric heaters, radiators, and stoves in Germany is now forbidden, according to the *National Zeitung*. Present stocks in the hands of manufacturers and dealers have been confiscated.—*Reuter* (Basle).

**South Africa.**—EXPLOSIONS DAMAGE POWER LINES.—The whole of the Vereeniging 20-kV transmission system was put out of action and telegraph, telephone and railway communication services between Bronkhorstspruit and Middelburg and other places were interrupted by a number of explosions which occurred on Thursday last week in the area of the Rand gold mines. It is stated that several arrests have been made. Normal conditions were restored by the next day, when all the mines were said to be working to full capacity. Mr. T. G. Otley, general manager of the Victoria Falls & Transvaal Power Co., described the explosions as an organised attempt to shut down the mining industry and to endanger the lives of men working underground. The Minister of Justice (Dr. Colin Steyn) has announced that the death penalty is to be imposed for acts of sabotage.

**United States.**—OUTDOOR TURBINE.—The accompanying photograph, reproduced from the *Electrical World*, shows a 10,000-kW Allis-Chalmers outdoor turbine installation recently completed at Burbank, California. There is only a small metal enclosure over the turbine end and turbine gauge board, as weather protection. The unit operates with steam at 650 lb. pressure and 825 deg. A second unit is to be installed.

## French Electrical News

**(From a Correspondent)**

THE recent restriction in electricity consumption for domestic purposes has been followed by threats of further cuts. Explaining this recently the Government stated that industrial production was more necessary than ever, and hydro-electric plants were not producing to capacity because it had been a dry year.

Meanwhile the Government policy is quite contradictory. While domestic consumption has been cut and many "Metro" stations are being closed the electrification of the Valley of the Chevreuse railway goes on. This line used to run from the Bastille by Massy-Palaiseau, serving one of the most beautiful districts near Paris. The electrification of the line will transfer it to the "Metro," and it is understood that the Bastille station will be closed.

Among other restrictions is one which forbids the sale of all electrical domestic articles such as heaters, fires and cooking ranges. Exception is made of electric irons, water heaters not exceeding one litre, and storage cookers, which, however, can only be bought if an ordinary electric cooker is surrendered. It is learned that a Paris firm has brought out a new storage type of cooker with three hot-plates and an oven. It weighs 130 kilogrammes and is rated at 450 W. The hot-plates and oven are heated by directing air across the solid element and then over the hot-plates or through the oven.

# FINANCIAL SECTION

## *Company News. Stock Exchange Activities.*

## Reports and Dividends

**North-Eastern Electric Supply Co.**—This company is the first to effect the conversion of stock under the terms announced by the Chancellor of the Exchequer in November last. Notice is being given of the redemption of the outstanding amount of £2,202,000 of 5 per cent. consolidated debenture stock and the holders are being offered an equivalent amount of a new 3¼ per cent. stock redeemable by 1980 by the operation of a cumulative sinking fund; the final redemption date of the 5 per cent. stock was 1980. The company has the option of repaying the stock at 102 during the first five years, 101 during the second five years and thereafter at par. The whole of the stock may be repaid at par in or after 1962. It is stated that there will be no offer to the public of any stock not taken up.

The redemption of the old stock is to be effected on May 1st and holders are given six weeks in which to convert.

**Westinghouse Brake and Signal Co., Ltd.**—The full accounts now issued confirm the preliminary figures given in our issue of January 23rd. The trading profit for the year to September 30th, after charging depreciation, expenses and taxation amounts to £143,039, as compared with £162,573 for 1939–40, and after deducting directors' fees the net profit is £141,629 (against £159,781). General reserve is increased to £500,000 by £25,000, staff pensions receive £10,000, and reserve for contingencies receives £50,000. The dividend is maintained at 10 per cent. less tax at 9s. 8·532d. (8s. 6d.) and the balance carried forward is £91,273 (against £92,384 brought in).

**Consolidated Signal Co., Ltd.**—Assuming that the Westinghouse Brake & Signal Co. approves the proposed dividend of 10 per cent. at its meeting, it is proposed that the dividend on the ordinary stock shall be maintained at 17 per cent.

**The La Plata Electric Tramways Co.** has announced its intention of calling a meeting of shareholders to receive a report concerning the company's affairs and to authorise the presentation of a petition for the winding-up of the company on the grounds of its insolvency. In order to clear up the position on the British side the debenture stockholders are to be asked at a meeting, convened for to-day (Friday) to sanction the application of the sinking fund moneys, amounting to £4,660, partly by distribution of £3,132 to themselves by way of the return of 4 per cent. of the outstanding stock and as to the balance of £1,528 by making partial payments to British creditors.

**J. & E. Hall, Ltd.,** report a profit for the year ended September 30th of £72,911 (against £65,841), before charging £27,000 for income tax (against £17,000), and the net profit is £45,911 (£48,841). It is proposed to pay a first and final ordinary dividend of 8½ per cent. (1s. 8·4d. per share), less tax (same), and to carry forward £43,639 (against £43,008 brought in).

**Madras Telephone Co.**—A *Reuter* message states that following the purchase of 53 per cent. of the Madras Telephone Co.'s share capital owned by the Oriental Telephone & Electric Co., Ltd., the Government of India, it is understood, has decided to purchase the shares of other shareholders in the Madras Co. at the same purchase price of Rs.14½ each.

**The Ceara Tramway Light & Power Co.** reports a net sterling revenue for the year to June 30th of £31,169, as compared with £13,016 in the previous year. After providing for depreciation, taxation and other charges, there is a debit of £1,341 (against a debit of £5,668), charged (as before) to contingencies.

**The Manx Electric Railway** earned gross receipts of £12,619 in 1940-41 (against £5,657). After meeting expenditure there was a loss of £38, as compared with £7,349 in 1939-40, increasing the debit carried forward to £17,482. There was a substantial increase in the number of passengers carried.

**Redfern's Rubber Works, Ltd.,** has declared a final ordinary dividend of 6¼ per cent., making 10 per cent. for the year. For 1940 the same dividend was paid but there was in addition a bonus of 2 per cent.

**Joseph Lucas, Ltd.,** have announced an interim dividend of 2½ per cent. on the 5 per cent. cumulative "A" preference and 3 per cent. on the 6 per cent. cumulative "B" preference shares.

**R. A. Lister & Co., Ltd.,** are paying a final ordinary dividend of 11 per cent., making 16 per cent., less tax, for the year to September 30th (unchanged).

**The Electrical & Industrial Investment Co.** has again declared a dividend for the year of 12 per cent.

**Companies Struck off the Register.**—The names of the following companies have been struck off the Register and they are thereby dissolved:—Anti-Vibration Electric Lamp Co., Ltd.; Brice (Electrical), Ltd.; Terrytone Radio Products Co., Ltd.; Bustler Electric Co. (Birmingham), Ltd.; Electric Power & General Finance Corporation, Ltd.; Gold Seal Battery Co., Ltd.; Hornby Electric Supplies Co., Ltd.; Stores Radio, Ltd.

## New Companies

**Stanley Cattell, Ltd.**—Private company. Registered January 23rd. Capital, £2,000. Objects: To acquire the business of a radio and electrical contractor carried on by S. N. Cattell at 9, East Street, Torquay. Directors: S. N. Cattell, Tree Tops, Central Avenue, Paignton, R. S. Broom, Thatcher Lee, Baymount, Paignton, and I. K. Dyer, Latmus, Murley Crescent, Bishopsteignton. Registered office: 9, East Street, Torquay, Devon.

**Relay Systems (Rawtenstall), Ltd.**—Private company. Registered January 24th. Capital, £500. Objects: To carry on the business of relaying wireless and television programmes, etc. Directors: A. R. Duckett, Moss Houses Cottage, Foulridge, nr. Colne, and two others. Registered office: 11, Nicholas Street, Burnley.

**Kirkpatricks' Engineering Works, Ltd.**—Private company. Registered in Belfast January 7th. Capital, £10,000. Objects: To acquire the business of a mechanical and electrical engineer carried on by Wm. J. H. Kirkpatrick, as Kirkpatricks' Engineering Works at Cooke Street and Bankmore Street, Belfast. J. H. Kirkpatrick, 5, Ravensdene Park Gardens, Belfast, is the first director. Registered office: 65, Cooke Street, Belfast.

**Victoria Springs, Ltd.** — Private company. Registered January 9th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, springs, electrical, mechanical, radio, television and general engineers, wire drawers, tool and accessory makers, etc. Subscribers: S. S. Fisher, 90, Village Way, Pinner, Middlesex, and G. J. Auerbach, 48, Crown Street, Reading, Berks. Secretary: Sylvia S. Fisher. Registered office: Hope House, Great Peter Street, S.W.1.

# Companies' Returns

## Statements of Capital

**Anglo-Argentine Tramways Co., Ltd.**—Capital, £11,000,000 in 800,000 first preferred and 710,000 second preferred shares of £5 and 862,500 ordinary shares of £4. Return dated August 8th. 640,000 first preferred, 610,000 second preferred and 675,000 ordinary shares taken up. £850,000 paid on 20,000 first preferred and 150,000 ordinary shares. £8,100,000 considered as paid on the remainder. Mortgages and charges: £4,465,674 4 per cent. first debenture stock; £1,733,380 4 per cent. second debenture stock; £6,000,000 4 per cent. income debenture stock, and an annuity of approximately £78,500.

**Nigerian Electricity Supply Corporation, Ltd.**—Capital, £545,000 in £1 shares. Return dated November 19th. All shares taken up. £450,076 paid. £94,924 considered as paid. Mortgages and charges: £240,338.

**Genristo, Ltd.**—Capital, £8,000 in 3,000 preference and 5,000 ordinary shares of £1. Return dated October 21st. 3,450 ordinary and 2,789 preference shares taken up. £6,239 paid. Mortgages and charges: Nil.

**Thomasson & Co. (Shrewsbury), Ltd.**—Capital, £1,000 in £1 shares. Return dated November 3rd. 769 shares taken up. £769 paid. Mortgages and charges: £3,489.

**International Resistance Co., Ltd.**—Capital, £2,500 in 10s. shares. Return dated May 15th. All shares taken up. £2,500 paid. Mortgages and charges: Nil.

**R. and P. Electrical Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated August 10th (filed September 19th). 1,000 shares taken up. £1,000 paid. Mortgages and charges: Nil.

**Eastern Telegraph Co., Ltd.**—Capital, £7,000,000 in £5,000,000 ordinary stock and £2,000,000 preference stock. Return dated July 11th. All stock taken up. £7,000,000 paid. Mortgages and charges: £2,000,000.

**Southern Brazil Electric Co., Ltd.**—Capital, £507,800 in 650,000 ordinary shares of 10s. and 182,800 preference shares of £1. Return dated November 11th. All shares taken up. £3 10s. paid on 7 ordinary shares. £507,796 10s. considered as paid on the remainder. Mortgages and charges: £756,415.

**Radio Gramophone Development Co., Ltd.**—Capital £25,000 in £1 shares. Return dated November 5th. All shares taken up. £36,250 paid (£1, per share, plus premium of £11,250). Mortgages and charges: Nil.

**Thorpe & Thorpe, Ltd.**—Capital £5,000 in 2,000 preference and 3,000 ordinary shares of £1 each. Return dated May 10th, 1940 (filed December 8th, 1941). 2,000 preference and 2 ordinary shares taken up. £2,002 paid. Mortgages and charges: £2,000.

**Rawlings Brothers, Ltd.**—Capital, £100,000 in £1 shares (70,000 ordinary and 30,000 preference). Return dated September 24th. 61,401 ordinary and 21,903 preference shares taken up. £83,304 paid. Mortgages and charges: Nil.

**New System Private Telephones, Ltd.**—Capital, £20,000 in 20,000 ordinary shares of £1 each. Return dated August 4th. All shares taken up. £33,000 paid (including £15,000 premium). £2,000 considered as paid. Mortgages and charges: Nil.

**Cunningham Electrical & Radio, Ltd.**—Capital, £1,000 in 1,000 shares of £1 each. Return dated December 10th. 800 shares taken up. £800 paid. Mortgages and charges: Nil.

**Tungstone Accumulator Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated August 18th. 500 shares taken up. £500 paid. Mortgages and charges: Nil.

**Tungwire, Ltd.**—Capital, £6,000 in 4,000 preference and 2,000 ordinary shares of £1. Return dated October 7th. All shares taken up. £6,000 paid. Mortgages and charges: Registered debentures for £5,000.

## Mortgages and Charges

**Underwood (Electric), Ltd.**—Assignment on January 7th, 1942, of proceeds of certain contracts to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £2,300.

**F. Fradley, Ltd.**—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated January 8th, 1942, to secure £750. Holders: Branch Nominees, Ltd.

**W. Skewes & Co., Ltd.**—Mortgage on 12 and 12a, South Parade, Doncaster, dated January 15th, 1942, to secure £1,900. Holders: Ind Coope & Allsopp, Ltd., Victoria House, Vernon Place, W.C.1.

# Bankruptcies

**A. L. Pearce,** electrical supplies dealer, 12, Fore Street, Newquay.—Last day for receiving proofs for dividend, February 11th. Trustee, Mr. C. Hancock, 12, Princes Street, Truro, Official Receiver.

**P. W. Penty,** electrical contractor, trading as Sackville Electrical Co., 38, Manville Terrace, Morley Street, Bradford.—Last day for receiving proofs for dividend, February 14th. Trustee, Mr. E. T. Sanders, 71, Manningham Lane, Bradford, Official Receiver.

# STOCKS AND SHARES

TUESDAY EVENING.

THE general trend of Stock Exchange activity is being affected by the continued uncertainties that surround the war position in the Middle East. It may be that before this issue of the ELECTRICAL REVIEW appears, definite results will have been achieved, but the present situation has led to a noticeable diminution of business. It has exerted, however, little influence over prices. Markets in the investment groups are sustained by the knowledge of the many millions of money which are going to be distributed in respect of the latest Indian and Canadian Vesting Orders. That some of this money will be earmarked for employment in the ordinary shares of the best-class industrial companies, is taken so much for granted that prices of the latter are advancing, fresh gains being secured almost every business day.

**Latest Vesting Order**

The prices of investment securities should, according to precedent, be fortified by the latest announcement of the Treasury to the effect that eighty Canadian Government and Canadian railway securities are to be acquired under the Vesting Orders which have already operated in respect of American, Indian and a number of other issues. The acquisition of the Canadian stocks fits into the general scheme of the national effort. The fact that certain of the stocks to be taken over are not actually repayable until some date further ahead, is not allowed to stand in the way of their acquisition by the British Treasury at this critical time.

The stocks are to be paid for at prices fixed by the Treasury on the basis of market quotations, and are fair in every case. Holders of the securities will be invited to subscribe to national war issues the capital which they will receive in the course of the next few weeks. But a certain amount of the money will come into the Stock Exchange markets for reinvestment into existing securities.

**Gilt-Edged Factors**

On the same day that the details were published of the requisitioning of Canadian securities, the Government announced a fresh series of National War Bonds and 3 per cent. bonds. It had been generally anticipated that this new issue, which was known to be near at hand, would be offered on terms slightly less advantageous to the lender of money than those attaching to the stocks already on tap. This, however, is not to be the case, because the new bonds will be on the same footing as the old.

This aroused a shade of disappointment, and prices of gilt-edged stocks, which might otherwise have been advanced on the Canadian announcement, were inclined to react, dullness being noticeable in the British Government group. Prices of other gilt-edged investments remain without material change.

**Home Railway Dividends**

It is generally assumed in the Stock Exchange market that the Home Railway dividend statements will come on or about February 19th. Optimism toys with the idea of an improvement in the distributions to be made by the London Passenger Transport Board and the Southern Railway Company. With regard to the former, the estimate of an increase upon the previously paid 3 per cent. would appear to be decidedly optimistic. Assuming, for safety's sake, repetition of the 3 per cent. paid in respect of the previous twelvemonth, the yield on the money at to-day's price of 40 comes to £7 10s. per cent. By comparison with the return offered by some of the junior stocks in other Home Railway companies, this is not exciting.

Followers of the stock maintain, however, that the prospect after the war is sufficiently promising to make Transport "C" stock a good purchase at the current figure. In the case of the Southern Railway, the 5 per cent. preferred stock standing at 64½ will look cheap if, as is generally expected, the company repeats the 1¼ per cent. paid a year ago on the deferred stock.

**Price Fluctuations**

British Electric Traction deferred stock at 935 has put on 30 points, a movement that reflects the pressure to buy any stock that can claim to offer good security and, possibly, the chance of further appreciation. Mexican Light & Power first mortgage bonds at 80 are 5 points higher, on a judgment that was construed very favourably by Mexican oil interests and is considered to have a direct bearing upon the fortunes of other Mexican undertakings. A number of ordinary share prices in the Equipment and Manufacturing group have advanced; amongst them may be mentioned Associated Electrical, British Insulated, Enfield Cable, English Electric, General Electric, Hopkinsons and Siemens. In each of these cases there was an improvement of 1s. 3d. per share. Smaller gains were secured by Ever Ready, E. K. Cole and some of the radio companies' shares. Electric & Musical Industries lost 3d., at 14s. 3d. The cable group holds its ground; Marconi Marines are better at 28s. 9d.; Brush 5½ per cent. preference shares continue to be bought at 19s. 9d., and Electric Construction 7 per cent. preference have been changing hands on the basis of 30s.

**Callender's**

It may be of interest to quote a concrete illustration of the manner in which gilt-edged ordinary shares are snapped up nowadays. Within the past week, 10,000 Callender's Cable ordinary shares came into the market for sale. All but a thousand shares were promptly taken;

(*Continued on page* 189)

# ELECTRICAL INVESTMENTS

## *Prices, Dividends and Yields*

| Company | Dividend 1939-40 | Dividend 1940-41 | Middle Price Feb. 2 | Rise or Fall | Yield p.c. £ s. d. |
|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | |
| Bournemouth and Poole | 15 | 12½ | 55/- | +⅜ | 4 11 0 |
| British Power and Light | 7 | 6 | 27/- | .. | 4 10 7 |
| City of London | 7½ | 7 | 27/- | .. | 5 3 9 |
| Clyde Valley | 8 | 8 | 38/3 | .. | 4 3 9 |
| County of London | 10½ | 8 | 37/6 | +6d. | 4 5 4 |
| Edmundson's: | | | | | |
| 7% Pref. | 7 | 7 | 33/3 | .. | 4 4 4 |
| Ord. | 6 | 6 | 28/6 | .. | 4 4 3 |
| Elec. Dis. Yorkshire | 9 | 9 | 42/- | .. | 4 5 9 |
| Elec. Fin. and Securities | 12½ | 12½ | 43/9 | .. | 5 14 2 |
| Elec. Supply Corporation | 11½ | 10 | 45/- | .. | 4 9 0 |
| Isle of Thanet | 2 | Nil | 9/- | .. | — |
| Lancs Light and Power | 7½ | 7½ | 34/6 | .. | 4 7 0 |
| Llanelly Elec. | 5½ | 5½ | 22/- | .. | 5 0 0 |
| Lond. Assoc. Electric | 5½ | 4½ | 19/6 | .. | 4 12 4 |
| London Electric | 7 | 7 | 24/6 | .. | 5 14 3 |
| London Power Deb. Red. | 5 | 5 | 105 | .. | 4 15 3 |
| Metropolitan | 10 | 8 | 37/- | .. | 4 6 6 |
| Midland Counties | 8 | 8 | 38/9 | .. | 4 2 0 |
| Mid. Elec. Power | 9 | 9 | 41/3 | +⅛ | 4 7 4 |
| Newcastle Elec. | 7 | 7 | 27/6 | .. | 5 1 10 |
| North Eastern Elec.: | | | | | |
| Ordinary | 7 | 7 | 30/- | .. | 4 13 4 |
| 7% Pref. | 7 | 7 | 34/- | .. | 4 2 4 |
| Northampton | 10 | 10 | 44/6 | .. | 4 10 0 |
| Notting Hill 6% Pref. (£10) | 6 | 6 | 8½ | .. | — |
| Northmet Power: | | | | | |
| Ordinary | 10 | 7 | 35/- | .. | 4 0 0 |
| 6% Pref. | 6 | 6 | 30/6 | .. | 3 18 8 |
| Richmond Elec. | 6 | 6 | 23/9 | .. | 5 1 1 |
| Scottish Power | 8 | 8 | 38/9 | .. | 4 2 9 |
| Southern Areas | 5 | 5 | 19/6 | +9d. | 5 2 8 |
| South London | 7 | 7 | 25/- | .. | 5 12 0 |
| West Devon | 5 | 5 | 21/3 | .. | 4 14 1 |
| West Glos. | 4½ | 4½ | 20/- | .. | 4 10 0 |
| Yorkshire Elec. | 8 | 8 | 39/6 | −6d. | 4 1 0 |
| **Overseas Electricity Companies** | | | | | |
| Atlas Elec. | Nil | Nil | 5/- | .. | — |
| Calcutta Elec. | 8* | 7* | 33/6 | .. | — |
| Cawnpore Elec. | 10 | 10 | 30/- | .. | 6 12 4 |
| East African Power | 7 | 7 | 27/- | .. | 5 3 8 |
| Jerusalem Elec. | 7 | 5 | 18/9 | .. | 5 6 8 |
| Kalgoorlie (10/-) | 7½ | 7½ | 10/6 | −6d. | 7 2 10 |
| Madras Elec. | 6* | 4* | 22/6 | .. | 3 11 1 |
| Montreal Power | 1½ | 1½ | 25½ | .. | 5 17 8 |
| Palestine Elec. "A" | Nil | Nil | 20/9 | .. | — |
| Perak Hydro-elec. | 6 | 7 | 7/6 | .. | 18 13 4 |
| Shawinigan Power | 83cts. | 90cts. | 15½ | .. | — |
| Tokyo Elec. 6% | 6 | 6 | 12½ | .. | — |
| Victoria Falls Power | 15 | 15 | 80/- | −⅛ | 3 15 0 |
| Whitehall Inv. Pref. | 7½ | 7½ | 15/- | .. | 10 0 0 |

| Company | Dividend 1939-40 | Dividend 1940-41 | Middle Price Feb. 2 | Rise or Fall | Yield p.c. £ s. d. |
|---|---|---|---|---|---|
| **Public Boards** | | | | | |
| Central Electricity: | | | | | |
| 1950-70 | 5 | 5 | 111 | +1 | 4 13 1 |
| 1955-75 | 5 | 5 | 115 | .. | 4 7 0 |
| 1951-73 | 4½ | 4½ | 108 | .. | 4 3 4 |
| 1963-93 | 3½ | 3½ | 103 | .. | 3 8 0 |
| 1974-94 | 3¼ | 3¼ | 99 | .. | 3 5 8 |
| London Elec. Trans. Ltd. | 2½ | 2½ | 95 | .. | 2 12 10 |
| London & Home Counties 1955-75 | 4½ | 4½ | 109 | .. | 4 2 7 |
| Lond. Pass. Trans.: | | | | | |
| A | 4½ | 4½ | 119½ | .. | 3 15 4 |
| B | 5 | 5 | 119½ | .. | 4 3 8 |
| C | 1½ | 3 | 40 | .. | 7 10 0 |
| West Midlands J.E.A. 1948-68 | 5 | 5 | 110 | .. | 4 11 0 |
| **Telegraph and Telephone** | | | | | |
| Anglo-Am. Tel.: | | | | | |
| Pref. | 6 | 6 | 107½ | +1 | 5 11 8 |
| Def. | 1½ | 1½ | 24½ | .. | 6 2 5 |
| Anglo-Portuguese | 8 | 8 | 15/- | .. | 10 13 4 |
| Cable & Wireless: | | | | | |
| 5½ Pref. | 5½ | 5½ | 105½ | .. | 5 4 4 |
| Ord. | 4 | 4 | 69½ | .. | 5 15 2 |
| Canadian Marconi $1 | Nil | 4cts. | 6/- | .. | 2 10 6 |
| Globe Tel. & Tel.: | | | | | |
| Ord. | 8½* | 8½* | 30/- | .. | — |
| Pref. | 6 | 6 | 28/9 | .. | 4 3 4 |
| Great Northern Tel.: (£10) | 20 | 20 | 14½ | .. | — |
| Inter Tel. & Tel. | Nil | Nil | 3 | .. | — |
| Marconi-Marine | 7½ | 7½ | 28/9 | +⅛ | 5 4 1 |
| Oriental Tel. Ord. | 11½* | 16 | 60/- | .. | 5 6 8 |
| Telephone Props. | 6 | 6 | 10/- | .. | 12 0 0 |
| Tele. Rentals (5/-) | 10 | 10 | 9/- | .. | 5 11 1 |
| **Traction and Transport** | | | | | |
| Anglo. Arg. Trans.: | | | | | |
| First Pref. (£5) | Nil | Nil | 5/- | −6d. | — |
| 4% Inc. | Nil | Nil | 8½ | .. | — |
| Brit. Elec. Traction: | | | | | |
| Def. Ord. | 45 | 45 | 935 | +30 | 4 16 9 |
| Pref. Ord. | 8 | 8 | 170 | .. | 4 14 2 |
| Bristol Trams | 8* | 8 | 43/9 | .. | 3 13 1 |
| Brazil Traction | $1 | 50c. | 14 | −½ | — |
| Calcutta Trams | 8 | 5½ | 20/- | .. | 5 10 0 |
| Cape Elec. Trams | 5 | 5 | 18/6 | .. | 5 8 3 |
| Lancs Transport | 10 | 10 | 45/- | .. | 4 9 0 |
| Mexican Light: | | | | | |
| 1st Bonds | 5 | 5 | 80 | +5 | 6 5 0 |
| Rio 5% Bonds | 5 | 5 | 92½ | .. | 5 8 3 |
| Southern Rly.: | | | | | |
| 5% Prefd. | 5 | 5 | 64½ | +1 | 7 15 0 |
| 5% Pref. | 5 | 5 | 107½ | +1 | 4 13 0 |
| T. Tilling | 10 | 10 | 47/6 | .. | 4 4 2 |
| Tilling & B.A. | 7* | 6½* | 52/6 | .. | 2 9 6 |
| West Riding | 10 | 10 | 39/6 | .. | 5 1 3 |

(*Continued on next page*)

* Dividends are paid free of Income Tax.

| Company | Dividend 1939–40 | Dividend 1940–41 | Middle Price Feb. 2 | Rise or Fall | Yield p.c. |
|---|---|---|---|---|---|
| **Equipment and Manufacturing** | | | | | |
| | | | | | £ s. d. |
| Aron Elec. Ord. .. | Nil | 7½ | 28/– | .. | 6 10 4 |
| Assoc. Elec : | | | | | |
| Ord. .. .. | 10 | 10 | 45/– | +1/16 | 4 9 0 |
| Pref. .. .. | 8 | 8 | 38/9 | .. | 4 2 4 |
| Automatic Tel. & El. | 12½ | 12½ | 18/9 | .. | 5 2 6 |
| Babcock & Wilcox | 11 | 11 | 45/9 | .. | 4 16 1 |
| British Aluminium | 12½ | 10 | 45/9 | .. | 4 7 4 |
| British Insul. Ord. | 20 | 20 | 91/3 | +1/16 | 4 7 9 |
| British Thermostat (5/–) .. .. | 18½ | 18½ | 13/9 | .. | 6 14 6 |
| British Vac. Cleaner (5/–) .. .. | 12½ | 10 | 11/3 | .. | 4 9 0 |
| Brush Ord. .. | Nil | Nil | 4/6 | .. | — |
| Callender's .. | 15 | 15 | 73/9 | .. | 4 1 4 |
| Chloride Elec. Storage | 15 | 15 | 71/3 | .. | 4 4 3 |
| Consolidated Signal | 17 | 17 | 77/6 | .. | 4 7 8 |
| Crabtree (10/–) .. | 17½ | 17½ | 28/3 | .. | 6 4 0 |
| Crompton Parkinson Ord. (5/–) .. | 30 | 20 | 22/6 | .. | 4 9 0 |
| E. K. Cole (5/–) .. | Nil | 7 | 9/6 | +6d. | 3 13 9 |
| E.M.I. (10/–) .. | Nil | 6 | 14/3 | –3d. | 4 4 3 |
| Electric Construction | 10 | 10 | 34/6 | .. | 5 16 0 |
| Enfield Cable Ord. | 16½ | 12½ | 55/– | +1/16 | 4 11 0 |
| Elect. Switchgear (10/–) .. .. | 16 | 10 | 20/– | .. | 5 0 0 |
| English Electric .. | 10 | 10 | 40/– | +1/16 | 5 0 0 |
| Ensign Lamps (5/–) | 25 | 25 | 16/3 | .. | 7 13 10 |
| Ericsson Tel. (5/–) .. | 25* | 22* | 40/– | .. | 2 15 0 |
| Ever Ready (5/–) .. | 40 | 40 | 30/6 | +6d. | 6 11 4 |
| Falk Stadelmann .. | 7 | 7½ | 22/– | .. | 6 16 4 |
| Ferranti Pref. .. | 7 | 7 | 27/6 | .. | 5 1 10 |
| G.E.C. : | | | | | |
| Pref. .. .. | 6½ | 6½ | 33/9 | .. | 3 17 2 |
| Ord. .. .. | 20 | 17½ | 81/3 | +1/16 | 4 6 6 |
| Greenwood & Batley | 15 | 13 | 26/3 | .. | 9 18 2 |
| Hall Telephone (10/–) | 15 | 10 | 15/7½ | .. | 6 8 0 |
| Henley's (5/–) .. | 20 | 20 | 22/6 | .. | 4 9 1 |
| 4½% Pref. .. | 4½ | 4½ | 21/3 | .. | 4 4 8 |
| Hopkinsons .. | 15 | 15 | 46/3 | +1/16 | 6 9 10 |
| India-Rubber Pref. | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Intl. Combustion .. | 32½ | 30 | 107/6 | .. | 5 11 6 |
| J. Lucas .. .. | 15 | 15 | 67/6 | .. | 4 9 0 |
| Johnson & Phillips | 15 | 15 | 57/6 | .. | 5 4 4 |
| Lancashire Dynamo | 20 | 20 | 66/3 | .. | 6 0 10 |
| Laurence, Scott (5/–) | 15 | 15 | 11/– | .. | 6 16 4 |
| London Elec. Wire | 7½ | 7½ | 25/– | .. | 6 0 0 |
| Mather & Platt .. | 13½ | 10 | 42/6 | .. | 4 14 1 |
| Metropolitan Elec. Cable Pref. .. | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex .. .. | 20 | 20 | 97/6 | .. | 4 2 0 |
| Pye Deferred (5/–) .. | 25 | 25 | 15/– | .. | 8 6 8 |
| Revo (10/–) .. | 5 | 20 | 25/7½ | .. | 7 16 0 |
| Reyrolle .. .. | 12½ | 12½ | 56/3 | .. | 4 9 0 |
| Siemens Ord. .. | 7½ | 7½ | 26/3 | +1/16 | 5 14 3 |
| Strand Elec. (5/–) .. | 2 | 4 | 3/6 | .. | 5 14 4 |
| S. Smith (1/–) .. | 50 | 37½ | 7/– | .. | 5 7 2 |
| Switchgear & Cowans (5/–) .. | 10 | 15 | 10/– | .. | 7 10 0 |
| Tel. Condenser (10/–) | Nil | 5 | 11/3 | .. | 4 9 0 |
| T.C. & M. .. .. | 10 | 10 | 41/3 | .. | 4 17 0 |
| Telephone Mfg. (5/–) | 9 | 9 | 9/– | .. | 5 0 0 |
| Tube Investments .. | 23¾ | 20 | 85/9 | .. | 4 13 3 |
| Vactric (5/–) .. | 4 | Nil | 3/6 | .. | — |
| Vickers (10/–) .. | 10 | 10 | 17/3 | .. | 5 16 0 |
| Ward & Goldstone (5/–) .. .. | 20 | 20 | 16/6 | .. | 6 1 3 |
| Westinghouse Brake | 17½ | 10 | 50/– | .. | 4 0 0 |
| Walsall Conduits (4/–) | 55 | 55 | 32/6 | .. | 6 15 4 |
| West, Allen (5/–) .. | 7½ | 7½ | 5/– | .. | 7 10 0 |

* Dividends are paid free of Income Tax.

## Stocks and Shares (*Concluded from page* 187)

and, before this paragraph appears, the remaining 10 per cent. will have found a permanent home. The appetite of investment is sharp set for ordinary shares of this description. The question of yield is regarded as being of minor consequence compared with that of good security, and of promising prospects after the war is over. Ten thousand Callender's ordinary shares at the current price run into nearly £36,500 cash.

### Victoria Falls

Towards the end of last week, news was received from Cape Town reporting widespread sabotage on the property of the Victoria Falls & Transvaal Power Co. The first reports said that the properties affected extended over 230 miles of lines from east to west, and, from north to south, 30 miles. Later cables suggested that the first reports had been somewhat exaggerated. However that may be, prices of shares in companies likely to be damaged by deeds of sabotage in South Africa, underwent little alteration. Victoria Falls ordinary eased off to £4, showing 1/16 decline on the week. This cannot be regarded as serious, seeing that at 80s. the return on the present-paid dividend of 15 per cent. is no more than £3 15s. 0d. per cent. on the money. The preference went back to 35s.

### Anglo-American Telegraph

The Anglo-American Telegraph Co. declared last month the usual 1½ per cent. dividend on its deferred stock for the year recently ended. The price is now standing at 24½, at which the return on the money is half-a-crown over 6 per cent. The preferred stock receives its dividend four times a year. In view of the present paper shortage and difficulties of staff, it is suggested that half-yearly dividend payments on the preferred stock would make a contribution to national economy and, at the same time, would be received without complaint by those to whom the dividend cheques are sent.

The Anglo-American Telegraph Co. is leased for a period of 99 years from April, 1911, to the Western Union Co., the American concern, whose accounts show that the amount required for payment of the rental is well covered. The Western Union looks after the repair and renewal of the Anglo-American cables.

# NEW PATENTS

## *Electrical Specifications Recently Published*

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification* (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

### 1939

14426. "Time-controlled switching and tuning arrangements for radio receivers." A. B. Thomsen. May 16th, 1938. (542352.)

### 1940

4015. "Electronic amplifiers." W. W. Groves (Automatic Signal Corporation). March 4th, 1940. (Convention date not granted.) (542356.)

5921. "Bipolar electrolysers." Maschinenfabrik Oerlikon. February 17th, 1940. (542358.)

7465. "Arrangements for controlling the transfer of signals, particularly applicable to television." Philco Radio & Television Corporation. May 11th, 1939. (542436.)

7892. "Electron-discharge devices." J. D. McGee, H. Miller and G. S. P. Freeman. May 2nd, 1940. (542488.)

10028. "Tuned amplifier circuit arrangements." E. L. C. White, and E. W. Bull. June 8th, 1940. (542469.)

10946. "Cleaning of fluid heaters by elastic cleaning fluid, and cleaners for fluid heaters." Babcock & Wilcox, Ltd., and C. H. Davy. June 27th, 1940. (542489.)

10978. "Electrical measuring systems." Marconi's Wireless Telegraph Co., Ltd. June 27th, 1939. (542442.)

11193. "Manufacture of graphite electrodes." J. A. M. W. Mitchell and Imperial Chemical Industries, Ltd. July 3rd, 1940. (542363.)

11305/11306. "Electron-discharge apparatus." Standard Telephones & Cables, Ltd., and H. Motz. July 5th, 1940. (542389/542390.)

11311. "Multiple-rope variable-speed pulley transmission gear." F. R. Mason, R. Embleton and Metropolitan-Vickers Electrical Co., Ltd. July 5th, 1940. (542416.)

11337. "Thermionic valve circuits having a constant output." B. M. Hadfield. July 6th, 1940. (542366.)

11341. "Electro-pneumatic control of apparatus operated by fluid under pressure." Westinghouse Brake & Signal Co., Ltd., A. G. Kershaw, and A. W. Simmons. July 6th, 1940. (Cognate application, 14642/40.) (542391.)

11345. "Electrically propelled road vehicles." H. G. McClean, E. D. Wortley and Crompton Parkinson. July 6th, 1940. (542491.)

11396. "Lighting and sterilising apparatus." G. R. Shepherd (Westinghouse Electric International Co.). July 8th, 1940. (542417.)

11440. "Thermionic cathode structures for electric-discharge devices." British Thomson-Houston Co., Ltd. July 11th, 1939. (Addition to 536070.) (542495.)

11445. "Conveyance of articles through furnaces." J. McDonald and G.W.B. Electric Furnaces, Ltd. July 9th, 1940. (542472.)

11455. "Electric power cables." J. S. Mollerhoj. May 20th, 1939. (Cognate application, 11456/40.) (542473.)

12294. "Electric - discharge apparatus." British Thomson-Houston Co., Ltd. July 29th, 1939. (542393.)

12488. "Electrical installation junction boxes." Conduit Fittings, Ltd., and J. Smith. August 2nd, 1940. (542394.)

12602. "Electrical switchgear equipments having isolating arrangements." British Thomson-Houston Co., Ltd., P. R. H. Trencham and T. D. Regis. August 5th, 1940. (542420.)

12887. "Multi-voltage electric supply systems." English Electric Co., Ltd., and C. C. McLaren. August 12th, 1940. (542421.)

13001. "Tuning arrangements of radio receivers." Mullard Radio Valve Co., Ltd., and C. C. Eaglesfield. August 14th, 1940. (542395.)

13120. "Electric valve control circuits." British Thomson-Houston Co., Ltd. August 17th, 1939. (Addition to 535933.) (542451.)

13399. "Wave transmission networks." Standard Telephones & Cables, Ltd. November 10th, 1939. (542452.)

13609. "Secret telephony and the like by radio." General Electric Co., Ltd., and A. Bloch. August 29th, 1940. (542424.)

14071. "Method of joining electric cables." A. E. Lake. September 11th, 1940. (542397.)

14293. "Electrical measuring instruments such as voltmeters or ammeters." Aron Electricity Meter, Ltd., and E. J. Riordan. September 17th, 1940. (542454.)

14469. "Machines for manufacturing electric lamps and similar devices." British Thomson-Houston Co., Ltd. September 22nd, 1939. (Addition to 521918.) (542399.)

14711. "Dynamo machines having permanent-magnet excitation." British Thomson-Houston Co., Ltd. September 30th, 1939. (542370.)

14720. "Telephone systems." Siemens Bros. & Co., Ltd., and D. L. Clay. September 30th, 1940. (542455.)

15109. "Food storage receptacle for refrigerators." British Thomson-Houston Co., Ltd. October 11th, 1939. (542456.)

15170. "Power supply arrangements for thermionic amplifiers." Standard Telephones & Cables, Ltd. October 12th, 1939. (542404.)

15628. "Freezing trays." British Thomson-Houston Co., Ltd. October 24th, 1939. (Addition to 506103). (542457.)

16209. "Electric accumulators." Chloride Electrical Storage Co., Ltd. (C. C. White). November 7th, 1940. (542405.)

16540. "Electric terminals and couplings." Telephone Manufacturing Co., Ltd., L. H. Paddle, and J. S. N. Cook. November 15th, 1940. (542406.)

### 1941

1176. "Electric timing devices." Igranic Electric Co., Ltd., and J. R. Taylor. January 29th, 1941. (542461.)

5440/5441. "Electron-discharge devices." J. D. McGee, H. Miller, and G. S. P. Freeman. May 2nd, 1940. (Divided out of 542488.) (542496/542497.)

9710. "Electrically propelled road vehicles." H. G. McClean, E. D. Wortley and Crompton Parkinson, Ltd. July 6th, 1940. (Divided out of 542491.) (542498.)

10514. "Sealing of electrical conductors into envelopes of quartz or the like." Scophony, Ltd., and H. P. Barasch. July 19th, 1940. (Addition to 488993.) (Divided out of 541980.) (542433.)

10620. "Electrode biasing arrangements in high-frequency apparatus." J. W. Dalgleish, S. R. Poole and Pye, Ltd. February 7th, 1940. (Divided out of 542277.) (542408.)

11623. "Coupling-circuit arrangements in radio receivers." Marconi's Wireless Telegraph Co., Ltd., C. S. Cockerell, J. D. Brailsford and M. H. Cufflin. February 23rd, 1940. (Divided out of 542240.) (542485.)

14268. "Elastic-fluid turbines." English Electric Co., Ltd., and H. G. Yates. July 5th, 1940. (Divided out of 542292.) (542462.)

# CONTRACT INFORMATION

## *Accepted Tenders and Prospective Electrical Work*

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Australia.**—NEW SOUTH WALES.—March 19th. Sydney County Council Electricity Department. Motor-driven vacuum cleaning plant, fixed type, for Bunnerong power station. Specification 570.

**Belfast.**—February 11th. Electricity Department. Supply of electrical materials. (January 16th.)

**Birkenhead.** — February 16th. Electricity Department. Power transformers and electric lamps. (January 30th.)

**Kettering.** — March 2nd. Electricity Department. Switchboard extensions, 4,000-kVA transformer, etc. (See this issue).

**Plymouth.**—February 14th. Electricity Supply Department. Condenser circulating water screen. (January 30th.)

**Tottenham.**—February 13th. Borough Council. Electric lamps. Schedule No. 20. Forms of tender from E. Townson, town clerk, Town Hall, London, N.15.

## Orders Placed

**Australia.**—VICTORIA.—Electricity Commission. Accepted Triple-braided copper aerial cable (£5,296).—British Insulated Cables, Ltd.

NEW SOUTH WALES.—Newcastle City Council. Accepted. Armoured cable, paper insulated. lead covered:—W. T. Henley's Telegraph Works Pty., Ltd.; Lawrence & Hanson Electrical Pty., Ltd.; Enfield Cable Works (Australia), Pty., Ltd.

**Ealing.**—Town Council. Accepted. 1,000-kVA transformer (£1,262).—Ferranti, Ltd.

**London.**—ST. MARYLEBONE.—Baths Committee. Accepted. Installation of six loud speakers at Seymour Hall (£200).—Standard Telephones & Cables, Ltd.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Ashington.**—Feeding centres at South and Bothal Schools; B. Preston, U.D.C. surveyor.

**Bedford.**—Report centre, Harpur Street (£1,249); Warton & Goodship.

**Bingley.**—Two British Restaurants; E. O. Robinson, surveyor, Town Hall.

**Birmingham.**—Cleansing stations (£3,120); city engineer.

**Bradford.**—Maternity hospital, Semon Convalescent Home (£1,200); city engineer.

**Chester.**—Canteen; Walkers, Parker & Co., Ltd.

Canteen, St. Peter's school (£598); borough engineer.

**Clydebank.**—Extension for D. & J. Tullis; manager.

**Croydon.**—School shelters (£8,775); borough engineer.

**Cumberland.**—Adaptation of further premises for school feeding purposes (£3,000); county architect, 4, Alfred Street North, Carlisle.

**Dumfries.**—Building at Carnation milk factory for General Milk Products, Ltd. (£1,700); the manager.

British Restaurant for Corporation (£1,400); burgh surveyor.

**Durham.**—Shelters at rest centres (£6,000). Contractors: D. Glen, Jarrow-on-Tyne, H. F. Mole, Chester-le-Street, and W. Pearson & Sons, West Hartlepool.

**Eccles.**—School kitchen, Beech Street (£4,058); borough engineer.

**Guildford.**—Extension; Whitehouse Precision & Engineering Co., Ltd.

**Hull.**—Reconstruction; Storry, Smithson, Ltd. Repairs; Humber Brick Works, Ltd.

Extensions, Cottingham kitchens (£2,000); city engineer.

**Hyde.**—British Restaurants; T. H. Higson, borough surveyor, Town Hall.

**Ilford.**—Cleansing station, Cleveland Road (£1,018); Hammond & Miles, Ltd.

**Jarrow-on-Tyne.**—Garages and dining hall; J. S. Weir, borough engineer, Town Hall, Jarrow.

**Lancashire.**—Junior and Infants' School at Droylsden; A. Evans, county architect, County Offices, Preston.

**London.** — BATTERSEA. — Shelters (£10,400); borough engineer.

BLACKHEATH.—Additions, for Holmes Plating Co., Ltd.; C. H. Linnell.

CAMBERWELL.—Garage, Grove Vale (£3,115); Galbraith Bros.

LEWISHAM.—Nurseries, Rushey Green and Bellingham, and decontamination station, Blackheath Hill; borough engineer.

New buildings, for S. W. Farmer & Son, Ltd.; T. P. Bennett & Son.

PADDINGTON.—Nursery, Westbourne Park; borough engineer.

ST. MARYLEBONE.—Shelters and A.R.P. buildings (£79,000); borough engineer.

**Mansfield.**—Messroom; Mansfield Sand Co.

**Middlesex.**—Community centres, Schools, Hanwell (£1,300) and Mutton Lane, Potters Bar (£4,300); county architect.

**Newcastle-on-Tyne.**—Premises for Hardy & Stewart; Tasker & Childs, Trinity Buildings, New Bridge Street.

**North Shields.**—Rebuilding, *Evening News* offices, Nile Street, for Northern Press, Ltd; Wm. Stockdale, architect.

Rebuilding, 20, Clive Street, for J. J. Cameron; G. Pash.

Rebuilding Prince's Theatre, for Provincial Cinematograph Theatres, Ltd.; J. L. Ross.

**Northampton.**—Extension; Hanwell Engineering Co., Ltd.

Extension; Advance Motor Manufacturing Co., Ltd.

**Ormskirk.**—Installation of electric lighting in all public and communal shelters for R.D.C.; R. Rosbotham, engineer and surveyor, Council Offices, Derby Road, Ormskirk, near Liverpool.

**Ossett.**—Messroom; Britannia Brickworks, Ltd.

**Rawtenstall.**—Offices, Bacup Road; J. & E. Transport, Ltd.

**Rotherham.**—Additions at Oakwood Hall Sanatorium; V. Turner, borough engineer, Town Hall.

**Shipley.**—Restaurant, Otley Road; U.D.C. surveyor.

**Stratford-on-Avon.**—Additions at Joint Isolation Hospital (£1,700); P. C. Smart, borough engineer, Municipal Offices.

**Sutton Coldfield.**—Restaurant, Holland Road; borough engineer.

**West Hartlepool.**—Cooking depots at Jesmond Road, Elwick Road and Dyke House Schools; borough engineer.

**Wood Green.**—Restaurant, Crescent Road (£1,190); W. R. Cruse, Ltd.

**York.**—School canteens and nurseries; city architect.

# Brazil's Electrical Trade

## *General Reduction in 1940*

THE appended statement, based on the recently issued official trade returns of Brazil, shows the values of the leading electrical goods imported into that country in 1940, with a note of increase or decrease compared with 1939. The trade as a whole declined by 25 per cent. during the period and nearly every group was affected. Countries of origin cannot be stated as they are only given for the grand total of Brazilian trade. In the year under review imports into Brazil were supplied by the United States to the extent of more than one half the total value, and showed an increase approximately equivalent to the trade lost by Germany. The share of the United Kingdom was less than one-tenth.

It may be noted that last year the electrical import trade showed a marked recovery, but detailed figures are not yet available. There are combined totals for 1940 of the manufacture in the country of machinery, apparatus, etc., which include certain quantities of the simpler electrical machines and apparatus. The aggregate value then was 436,000 contos, compared with 334,000 contos in 1939.

An outstanding wartime problem for the Brazilian metal-working industries is the maintenance of supplies of tin, lead, copper and aluminium, which have to be imported. But the Federal Council for Foreign Trade announces that two plants for treating bauxite ores are being erected, one at Ouro Preto, in the State of Minas Geraes and the other near the city of Sao Paulo, and that it is hoped in the near future to supply aluminium not only for the domestic market but for Argentina as well. A lead plant near Sao Paulo has recently been started. The Council has recommended the investigation of the possibilities of exploiting the nickel, cobalt and copper deposits of Buriti, in the State of Goyaz and Liberdade, in the State of Minas Geraes.

| | 1940 £ (000) | Inc. or dec. £ (000) |
|---|---|---|
| Radio-telegraph and radio-telephone installations | 4 | — 10 |
| Telegraph and telephone receiving apparatus | 82 | — 89 |
| Radio receivers | 15 | — 24 |
| Other radio apparatus and accessories | 285 | — 26 |
| Radio valves | 51 | + 1 |
| Electro-medical apparatus | 29 | — 25 |
| Accumulators | 12 | — 21 |
| Generators | 84 | — 54 |
| Producer gas generator sets | 21 | + 7 |
| Motors | 62 | — 35 |
| Primary batteries | 14 | + 1 |
| Static transformers | 47 | — 61 |
| Lamps | 32 | + 3 |
| Other lighting material | 22 | + 3 |
| Electro-pneumatic tools | 12 | — 6 |
| Electric fans and vacuum cleaners | 33 | + 7 |
| Electric floor polishers | 43 | + 7 |
| Other domestic appliances | 9 | — |
| Insulated copper wire | 21 | — 3 |
| Flex | 27 | — 25 |
| Insulators | 14 | + 4 |
| Switch panels | 12 | — 16 |
| Electric measuring apparatus | 24 | — 9 |
| Electric lifts | 49 | — 2 |
| Lightning arrestors | 6 | — |

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| Inc. or dec. £ (000) |
|---|
| — 10 |
| — 89 |
| — 24 |
| — 26 |
| + 1 |
| — 25 |
| — 21 |
| — 54 |
| + 7 |
| — 35 |
| + 1 |
| — 61 |
| + 3 |
| + 3 |
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| — 16 |
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